Council of the European Union

Brussels, 24 February 2021
(OR. en)

6446/21
ADD 19

**Interinstitutional File:**
**2021/0048(NLE)**

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**COVER NOTE**

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| From: | Secretary-General of the European Commission, signed by Ms Martine DEPREZ, Director |
| date of receipt: | 23 February 2021 |
| To: | Mr Jeppe TRANHOLM-MIKKELSEN, Secretary-General of the Council of the European Union |
| No. Cion doc.: | SWD(2021) 37 final - Part 17/19 |
| Subject: | COMMISSION STAFF WORKING DOCUMENT IMPACT ASSESSMENT REPORT Accompanying the document Proposal for a COUNCIL REGULATION establishing Joint Undertakings under Horizon Europe European Partnership for a Circular Bio-based Europe |

Delegations will find attached document SWD(2021) 37 final - Part 17/19.

Encl.: SWD(2021) 37 final - Part 17/19

EUROPEAN
COMMISSION

Brussels, 23.2.2021
SWD(2021) 37 final

PART 17/19

**COMMISSION STAFF WORKING DOCUMENT**

# IMPACT ASSESSMENT REPORT

*Accompanying the document*

**Proposal for a COUNCIL REGULATION establishing Joint Undertakings under Horizon Europe**

**European Partnership for a Circular Bio-based Europe**

{COM(2021) 87 final} - {SEC(2021) 100 final} - {SWD(2021) 38 final}

# ANNEXES

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# Annex 1 Procedural information

## 1. LEAD DG, DECIDE PLANNING REFERENCES

Lead DG: Directorate General Research and Innovation (RTD)

Decide number: PLAN/2019/5305

## 2. ORGANISATION AND TIMING

Institutionalised partnerships are foreseen in Articles 185 and 187 of the Treaty on the Functioning of the European Union (TFEU). The preliminary agreement on Horizon Europe contained a list of possible areas for institutionalised partnerships based on Article 185 and 187. For each of these areas the Commission considered 12 potential institutionalised partnerships. Their set up involves new EU legislation and the establishment of dedicated implementing structures and therefore an impact assessment for each of these initiatives.

Following political validation in June 2019, the impact assessment process started with the publication of inception impact assessments for each initiative in August 2019.

An inter-service steering group (ISSG) on research and innovation partnerships under Horizon Europe was set up in May 2019 and held 4 meetings before submission of the Staff Working Document to the Regulatory Scrutiny Board (7 May 2019, 19 June 2019, 5 December 2019, 20 January 2020). The ISSG consisted of representatives of the Secretariat-General, Directorate-General for Budget, Directorate-General for Research and Innovation Directorate-General for Communications Networks, Content and Technology, Directorate-General for Mobility and Transport, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs, Directorate-General for Energy, Directorate-General for Environment, Directorate-General for Climate Action, and the Legal Service.

An online public stakeholder consultation was launched between September and November 2019, gathering 1635 replies for all 12 initiatives.

## 3. CONSULTATION OF THE RSB

Two upstream meetings with the Regulatory Scrutiny Board of were held on 10 July 2019 and 30 September 2019.

In accordance with the feedback received from the Regulatory Scrutiny Board on 12.06.2020 the Staff Working Document has been revised as presented in Figure 1. These revisions were endorsed by the Inter Service Steering Group on 27.07.2020.

## 4. EVIDENCE, SOURCES AND QUALITY

To ensure a high level of coherence and comparability of analysis for all candidate initiatives, an external study was procured to feed into the impact assessments of the 12 candidate

institutionalised partnerships [1] (Technopolis Group, 2020). It consisted of an horizontal analysis and individual thematic analyses for each of the initiatives under review.

For all initiatives, the evidence used includes desk research partly covering the main impacts and lessons learned from previous partnerships. A range of quantitative and qualitative data sources complement the evidence base, including evaluations; foresight studies; statistical analyses of Framework Programmes application and participation data and Community Innovation Survey data; analyses of science, technology and innovation indicators; reviews of academic literature; sectoral competitiveness studies and expert hearings. The analyses included a portfolio analysis, a stakeholder and social network analysis in order to profile the actors involved as well as their co-operation patterns, and an assessment of the partnerships' outputs (bibliometrics and patent analysis). A cost modelling exercise was performed in order to feed into the efficiency assessments of the partnership options. Public consultations (open and targeted) supported the comparative assessment of the policy options. For each initiative up to 50 relevant stakeholders were interviewed by the external contractor (policymakers, business including SMEs and business associations, research institutes and universities, and civil organisations, among others). In addition the analysis was informed by the results of the Open Public Consultation (Sep – Nov 2019), the consultation of the Member States through the Strategic Programme Committee and the online feedback received on the Inception Impact Assessments of the set of candidate Institutionalised European Partnerships.

A more detailed description of the methodology and evidence base used, completed by thematic specific methodologies, is provided in Annexes 4 and 6.

*Figure 1 Modifications to the draft Staff Working Document based on comments received from the Regulatory Scrutiny Board*

| **Responses to the positive opinion with reservations of the Regulatory Scrutiny Board** | |
|---|---|
| **(B) Summary of findings** | |
| **Despite improvements, the intervention logic is still not specific to the circular bio-based economy and does not focus on the choice of the type of partnership.** | Section 5.2 Description of the policy options has been further improved to clarify the best form of partnership for this initiative, and links with the intervention logic are clarified. |
| **Conclusions from evaluating the predecessor partnership are more present in the report, but they do not directly feed into the problem definition, the intervention logic, and the choice of options.** | Box 3 'Support for the field in the previous Framework Programmes – key strengths & weaknesses identified' under section 1.2 on EU relative positioning in the field explains how the continuous evaluation of the predecessor partnership BBI JU was carried out since its set-up in 2014. As a result, the new CBE initiative builds on the success of its predecessor while having evolved by learning from its shortfalls. These learnings |

[1] Technopolis Group, 2020, forthcoming.

| | |
|---|---|
| | are now better reflected in the problem definition, the intervention logic and choice of options. |
| **The report does not always present the different and sometimes critical stakeholders' opinions.** | The stakeholders` opinions are highlighted throughout the report. The diverging views of the Member States are now also presented under section 5.1 What is the baseline from which options are assessed. |
| **(C ) What to improve** | |
| **The central point of the assessment, i.e. the choice of the best form of a research partnership for the circular bio-based economy, is still largely absent from the intervention logic. This makes assessing different types of partnerships difficult, as the link between options, problems and objectives is not properly established.** | The main shortfall in the intervention logic was the missing link between the objectives and options (i.e. forms of partnership). The description of options included in the first version of the Impact Assessment followed closely the descriptive characteristics of options set for all R&I partnerships in the common part of the IA. The relevance of these characteristics for achieving the CBE objectives was therefore, not obvious.<br><br>To address this point, an additional description specifically related to objectives and functionalities was added to the tables in section 5.2. Thus the link between objectives and options was reinforced. This description is also a basis for scoring options later in the text. |
| **The problem description should better integrate the results of the evaluation of the current partnership. These include a number of organisational issues that are directly relevant for the choice of the best form of research partnership.** | In the intervention logic the organisational issues identified in the evaluation of the current partnership are related to the functionalities necessary for achievement of objectives. New elements of description were added to the tables in section 5.2 on how different types of partnership are able to deal with these organisational issues. |
| **The report should better explain the functioning and expected performance of the governance systems foreseen under** | There are elements of governance that are intrinsically linked to policy options (forms of partnership) and other elements of |

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| **each option. For instance, it should explain how these systems would help secure sufficient private sector financial contributions. It should also better describe what the different partners would contribute to the partnership, other than finance. It should also describe how the governance systems would address the potential risk of industry capture.** | governance that are choices within each policy option. The former are now described in section 5.2. The latter are described for the preferred policy option in section 6.4. The risk of industry capture will be mitigated by explicit formulation of public interest objectives and their integration into strategic/programming documents and operational rules.<br><br>The Commission is committed to use its power as a member of the Governing Board to ensure (a) transparency and representativeness of the partnership; (b) definition of public interests in the partnership and their integration into the SIRA and programming documents (Annual Work Programmes); and (c) improvement of effectiveness, among others by involving other innovation stakeholders through 'deployment stakeholders groups'. |
| **The report should further clarify the scoring system and in particular the relative importance of the different criteria. It should better justify and explain the assessment of options against the different criteria.** | The scoring is better justified by new elements of description of policy options that are related to functionalities and the ability to achieve objectives. |
| **The report should more comprehensively present different stakeholder views. In particular, it should include more critical voices throughout the report. The Board notes that the estimated costs and benefits of the preferred option in this initiative, as summarised in the attached quantification tables.** | The current version of the Impact Assessment report deals with two main criticisms by non-industrial stakeholders (see, for example, the critical report by the Corporate Europe Observatory). The criticism related to potential environmental impacts (land use change, impact on biodiversity and carbon emissions, etc.) is now addressed by the new general objective to ensure a high level of environmental performance of bio-based industry with related specific and operational objectives. The concern that the partnership may serve the interest of the private partner and less the public interests is addressed through the requirement on the governance of the future partnership (section 6.4).<br><br>Stakeholders' opinions are highlighted throughout the report. The diverging views of |

| | |
|---|---|
| | the Member States are now also presented under section 5.1 on What is the baseline from which options are assessed. |
| **(D) Conclusion DG RTD must revise the report in accordance with the Board's findings before launching the interservice consultation. If there are any changes in the choice or design of the preferred option in the final version of the report, the DG may need to further adjust the attached quantification tables to reflect this.** | |
| There report was revised to take account of the Boards comments. There were no changes made with regard to the choice or the design of the preferred option. | |

# Annex 2 Stakeholder Consultation

## 1. OVERVIEW FOR ALL CANDIDATE INSTITUTIONALISED EUROPEAN PARTNERSHIPS

### 1.1. Introduction

In line with the Better Regulation Guidelines,[2] the stakeholders were widely consulted as part of the impact assessment process of the 12 candidates for institutionalised partnerships, including national authorities, the EU research community, industry, EU institutions and bodies, and others. These inputs were collected through different channels:

- A feedback phase on the inception impact assessments of the candidate initiatives in August 2019, gathering 350 replies for all 12 initiatives on the "Have your say" web portal during a period of 3 weeks;
- A structured consultation of Member States performed by the EC services over 2019 through the Shadow Strategic Configuration of the Programme Committee of Horizon Europe (in line with the Article 4a of the Specific Programme of Horizon Europe). This resulted in 44 possible candidates for European Partnerships identified as part of the first draft Orientations Document towards the Strategic Plan for Horizon Europe (2021-2024), taking into account the areas for possible institutionalised partnerships defined in the Regulation.
- An online public stakeholder consultation administered by the EC, based on a structured questionnaire, open between September and November 2019, gathering 1635 replies for all 12 initiatives;
- A targeted consultation run by the external study contractors with a total of 608 interviews performed as part of the thematic studies by the different study teams between August 2019 and January 2020.

### 1.2. Horizontal results of the Open Public Consultation

The consultation was open to everyone via the EU Survey online system.[3] The survey contained two main parts to collect views on general issues related to European partnerships (in Part 1) and specific responses related to one or more of the 12 candidate initiatives (as selected by a participant). The survey was open from 11 September till 12 November 2019. The consultation was available in English, German and French and advertised widely through the European Commission's online channels as well as via various stakeholder organisations.

#### *1.2.1. Profile of respondents*

In total, 1635 respondents filled in the questionnaire of the open public consultation. Among them, 272 respondents (16.64%) were identified to have responded to the consultation as part of a campaign (coordinated responses). Based on the Better Regulation Guidelines, the groups of respondents where at least 10 respondents provided coordinated answers were labelled as *'campaigns',* segregated and analysed separately and from other responses. In total 11

[2] https://ec.europa.eu/info/files/better-regulation-guidelines-stakeholder-consultation_en
[3] https://ec.europa.eu/eusurvey/runner/ConsultationPartnershipsHorizonEurope

campaigns were identified, the largest of them includes 57 respondents[4]. In addition, 162 respondents in the consultation also display similarities in responses but in groups smaller than 10 respondents. Hence, these respondents were not labelled as campaigns and therefore were not excluded from the general analysis.

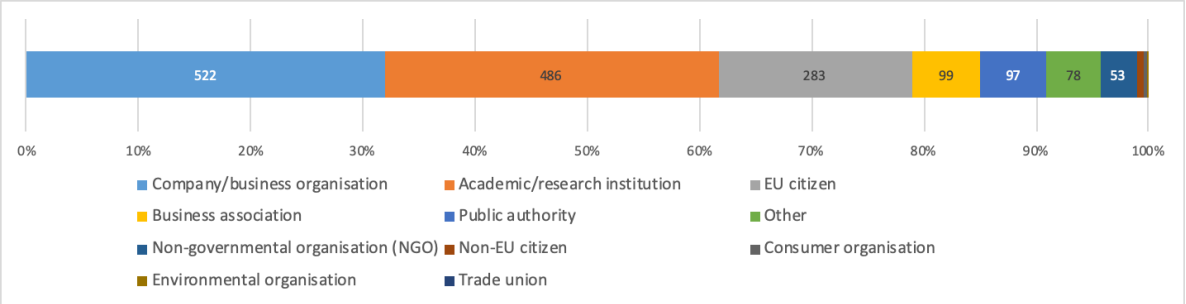
***Table 1: Country of origin of respondents (N=1635)***

| Country | Number of respondents | Percentage of respondents |
|---|---|---|
| Germany | 254 | 15.54% |
| Italy | 221 | 13.52% |
| France | 175 | 10.70% |
| Spain | 173 | 10.58% |
| Belgium | 140 | 8.56% |
| The Netherlands | 86 | 5.26% |
| Austria; United Kingdom | 61 | 3.73% |
| Finland | 49 | 3.00% |
| Sweden | 48 | 2.94% |
| Poland | 45 | 2.75% |
| Portugal | 32 | 1.96% |
| Switzerland | 28 | 1.71% |
| Czechia | 24 | 1.47% |
| Greece | 23 | 1.41% |
| Norway; Romania | 22 | 1.35% |
| Denmark | 20 | 1.22% |
| Turkey | 19 | 1.16% |
| Hungary | 14 | 0.86% |
| Ireland | 12 | 0.73% |
| United States | 11 | 0.67% |
| Estonia; Slovakia; Slovenia | 10 | 0.61% |
| Bulgaria; Latvia | 9 | 0.55% |
| Bosnia and Herzegovina | 7 | 0.43% |
| Lithuania | 4 | 0.24% |
| Canada; Croatia; Israel | 3 | 0.18% |
| China; Ghana; Iceland; Japan; Luxembourg; Morocco | 2 | 0.12% |
| Bhutan; Botswana; Cyprus; Iran; Malta; Mexico; Moldova; Mongolia; Palestine; Russia; Serbia; South Africa; Tunisia; Ukraine; Uruguay | 1 | 0.06% |

As shown in Figure 2, the three biggest **categories of respondents** are representatives of companies and business organisations (522 respondents or 31.9%), academic and research institutions (486 respondents or 29.7%) and EU citizens (283 respondents or 17.3%). Among the group of respondents that are part of campaigns, most respondents are provided by the same groups of stakeholders, namely company and business organisations (121 respondents or 44.5%), academic and research institutions (54 respondents or 19.8%) and EU citizens (42 respondents or 15.4%).

[44] The candidate Institutionalised Partnership Clean Hydrogen has the highest number of campaigns, namely 5. A few initiatives, such as Innovative SMEs, Smart Networks and Systems, were not targeted by campaigns. Some campaign respondents decided to provide opinions about several partnerships.

*Figure 2 Type of respondents (N=1635) - For all candidate initiatives*




Among all consultation respondents, 1303 (79.69%) have been **involved in the on-going research and innovation framework programme** Horizon 2020 or the preceding Framework Programme 7, while 332 respondents (20.31%) were not. In the group of campaign respondents, the share of those who were involved in these programmes is higher (245 respondents out of 272 or 90.07%) than in the group of non-campaign respondents (1058 out of 1363 or 77.62%). When respondents that participated in the Horizon 2020 or in the preceding Framework Programme 7 were asked to indicate in which capacity they were involved in these programmes, the majority stated they were a beneficiary (1033 respondents) or applicant (852 respondents). The main stakeholder categories, e.g. companies/business organisation, academic/research institutions, etc., show a similar distribution across the capacities in which they 'have been involved in Horizon 2020 or in the Framework Programme 7' as the overall population of consultation respondents.

Among those who have been involved in Horizon 2020 or the preceding Framework Programme 7, 1035 respondents (79.43%) are/were **involved in a partnership**. The share of respondents from campaigns that are/were involved in a partnership is higher than for non-campaign respondents, 89.80% versus 77.03% respectively. The list of partnerships under Horizon 2020 or its predecessor Framework Programme 7 together with the numbers, percentages of participants is presented in Table 4**Error! Reference source not found.**, the table also show the key stakeholder categories for each partnership. Most consultation respondents participated in the following partnerships: Fuel Cells and Hydrogen 2 (FCH2) Joint Undertaking, Clean Sky 2 Joint Undertaking, European Metrology Programme for Innovation and Research (EMPIR) and in Bio-Based Industries Joint Undertaking. The comparison between the non-campaign and campaign groups of respondents shows that the overall distribution is quite similar. However, there are some differences. For the campaign group almost a half of respondents is/was involved in the Fuel Cells and Hydrogen 2 (FCH2) Joint Undertaking, a higher share of campaign respondents is/was participating in Clean Sky 2 Joint Undertaking and in Single European Sky Air Traffic Management Research (SESAR) Joint Undertaking.

When respondents were asked in which **role**(s) **they participate(d) in a partnership**(s), over 40% indicated that they act(ed) as partner/member/beneficiary in a partnership. The second largest group of respondents stated that they applied for funding under a partnership. The roles selected by non-campaign and campaign respondents are similar.

*Table 4: Partnerships in which consultation respondents participated (N=1035)*

| Name of the partnership | Number and % of respondents from both groups (n=1035) | Number and % of respondents from a non-campaign group (n=815) | Academic/research institutions | Business associations | Company/business organisations | Company/business organisations | EU citizens | NGOs | Public authority |
|---|---|---|---|---|---|---|---|---|---|
| Fuel Cells and Hydrogen 2 (FCH2) Joint Undertaking | 354 (33.33%) | 247 (30.31%) | 97 | 9 | 37 | 43 | 41 | 8 | 5 |
| Clean Sky 2 Joint Undertaking | 195 (18.84%) | 145 (17.79%) | 57 | 2 | 10 | 27 | 37 | 1 | 7 |
| European Metrology Programme for Innovation and Research (EMPIR) | 150 (14.49%) | 124 (15.21%) | 64 | 0 | 13 | 9 | 14 | 2 | 19 |
| Bio-Based Industries Joint Undertaking | 142 (13.72%) | 122 (14.97%) | 39 | 8 | 20 | 27 | 14 | 1 | 6 |
| Shift2Rail Joint Undertaking | 124 (11.98%) | 101 (12.40%) | 31 | 7 | 5 | 31 | 14 | 3 | 7 |
| Electronic Components and Systems for European Leadership (ECSEL) Joint Undertaking | 111 (10.72%) | 88 (10.80%) | 42 | 2 | 7 | 20 | 12 | 0 | 5 |
| Single European Sky Air Traffic Management Research (SESAR) Joint Undertaking | 66 (6.38%) | 46 (5.64%) | 10 | 3 | 3 | 20 | 3 | 2 | 3 |
| 5G (5G PPP) | 53 (5.12%) | 47 (5.77%) | 20 | 1 | 6 | 14 | 5 | 0 | 1 |
| Eurostrars-2 (supporting research-performing small and medium-sized enterprises) | 44 (4.25%) | 40 (4.91%) | 17 | 0 | 6 | 1 | 7 | 0 | 6 |
| Innovative Medicines Initiative 2 (IMI2) Joint Undertaking | 37 (3.57%) | 35 (4.29%) | 18 | 2 | 3 | 3 | 2 | 4 | 3 |
| Partnership for Research and Innovation in the Mediterranean Area (PRIMA) | 28 (2.71%) | 26 (3.19%) | 15 | 0 | 3 | 1 | 2 | 0 | 2 |
| European and Developing Countries Clinical Trials Partnership | 25 (2.42%) | 24 (2.94%) | 12 | 0 | 1 | 2 | 3 | 3 | 2 |
| Ambient Assisted Living (AAL 2) | 22 (2.13%) | 21 (2.58%) | 11 | 2 | 1 | 1 | 3 | 0 | 3 |
| European High-Performance Computing Joint Undertaking (EuroHPC) | 22 (2.13%) | 18 (2.21%) | 6 | 0 | 2 | 3 | 5 | 0 | 2 |

For the remaining of the consultation respondents could provide their views on each/several of the candidate initiatives. The majority of respondents (31.4%) provided their views on the Clean Hydrogen candidate partnership. More than 45% of respondents from the campaigns selected this partnership. Around 15% provided their views for European Metrology, Clean Aviation and Circular Bio-based Europe. The share of respondents in the campaign group that chose to provide views on the Clean Aviation candidate partnership is of 20%. The smallest number of respondents provided opinions on the candidate initiative 'EU-Africa research partnership on health security to tackle infectious diseases – Global Health'.

*Table 5: Candidate Institutionalised Partnerships for which consultation respondents provide responses (N=1613)*

| Name of the candidate Institutionalised European partnership | Number and % of respondents from both groups (n=1613) | Number and % of respondents from a non-campaign group (n=1341) |
|---|---|---|
| Clean Hydrogen | 506 (31.37%) | 382 (28.49%) |
| European Metrology | 265 (16.43%) | 225 (16.78%) |
| Clean Aviation | 246 (15.25%) | 191 (14.24%) |
| Circular bio-based Europe | 242 (15%) | 215 (16.03%) |
| Transforming Europe's rail system | 184 (11.41%) | 151 (11.26%) |
| Key Digital Technologies | 182 (11.28%) | 162 (12.08%) |
| Innovative SMEs | 111 (6.88%) | 110 (8.20%) |
| Innovative Health Initiative | 110 (6.82%) | 108 (8.05%) |
| Smart Networks and Services | 109 (6.76%) | 107 (7.98%) |
| Safe and Automated Road Transport | 108 (6.70%) | 102 (7.61%) |
| Integrated Air Traffic Management | 93 (5.77%) | 66 (4.92%) |
| EU-Africa research partnership on health security to tackle infectious diseases – Global Health | 49 (3.04%) | 47 (3.50%) |

### *1.2.2. Characteristics of future candidate European Partnerships*

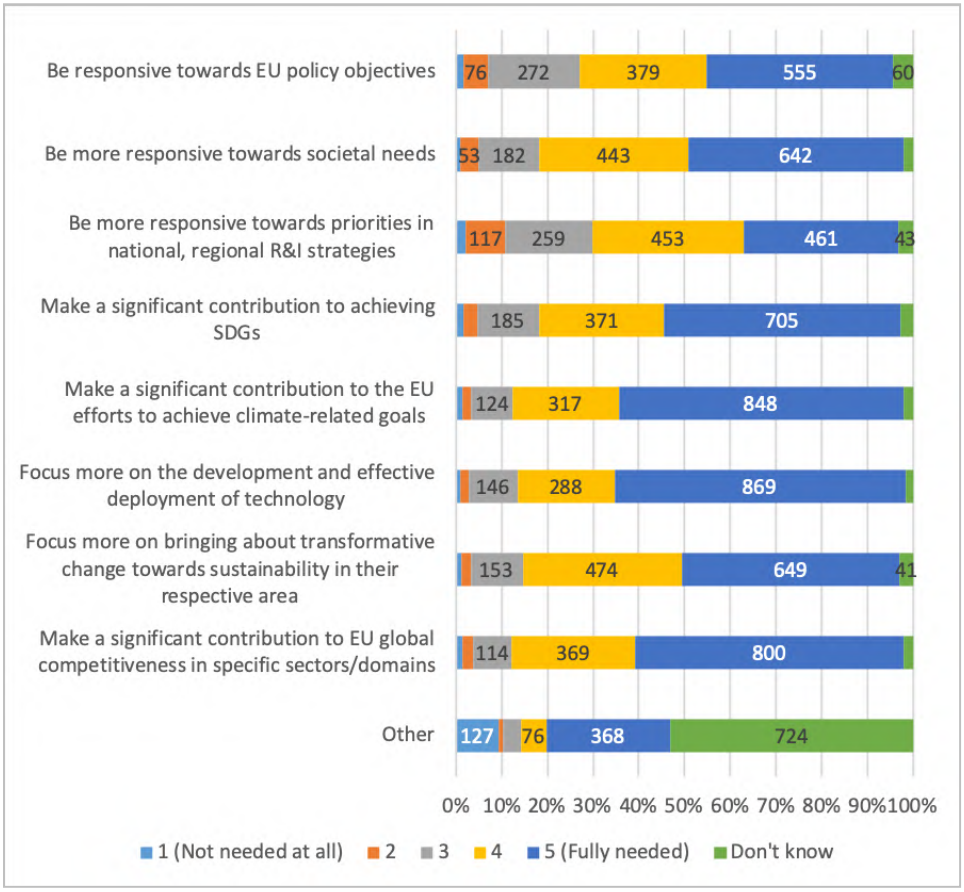
Respondents were asked to assess what areas, objectives, aspects need to be in the **focus of the future European Partnerships** under Horizon Europe and to what extent. According to Figure 6, a great number of respondents consider that a significant contribution by the future European Partnerships is 'fully needed' to achieve climate-related goals, to the development and effective deployment of technology and to EU global competitiveness in specific sectors/domains. Overall, respondents' views reflect that many aspects require attention of the Partnerships. The least attention should be paid to responding towards priorities of national, regional R&D strategies, including smart specialisation strategies, according to respondents.

Overall, only minor differences can be found between the main stakeholder categories. Academic/research institutions value the responsiveness towards EU policy objectives and focus on development and effective deployment of technology a little less than other respondents. Business associations, however, find that the future European Partnerships under Horizon Europe should focus a little bit more on the development and effective deployment of

technology than other respondents. Furthermore, business associations, large companies as well as SMEs value the role of the future European Partnerships for significant contributions to EU global competitiveness in specific sectors domains a little higher than other respondents. Finally, both NGOs and Public authorities put a little more emphasis on the role of the future European Partnerships for significant contributions to achieving the UN SDGs. The views of citizens (249, or 18.3%) do not reflect significant differences with other types of respondents. However, respondents that are/were directly involved in a partnership under Horizon 2020 or its predecessor Framework Programme 7 assign a higher importance of the future European Partnerships to be more responsive towards EU policy objectives and to make a significant contribution to achieving the UN's Sustainable Development Goals.

A qualitative analysis of the "other" answers highlights the importance of collaboration and integration of relevant stakeholders to tackle main societal challenges and to contribute to policy goals against which fragmentation of funding and research efforts across Europe should be avoided. Additionally, several respondents suggested that faster development and testing of technologies, acceleration of industrial innovation projects, science transfer and market uptake are needed. Next to that, many respondents provided answers related to the hydrogen and the energy transition, which corresponds to the high number of respondents that provided answers to the candidate initiative on this topic.

***Figure 6: To what extent do you think that the future European Partnerships under Horizon Europe need to (N=1363) (non-campaign replies) For all candidate initiatives***



### *1.2.3. Main advantages and disadvantages of Institutionalised European Partnerships*

An open question asked to outline the main advantages and disadvantages of participation in an Institutionalised European Partnership (as a partner) under Horizon Europe (1551 respondents). The advantages mentioned focus on the development of technology, overall collaboration between industry and research institutions, and the long-term commitment. Disadvantages mentioned are mainly administrative burdens. An overview is provided below.

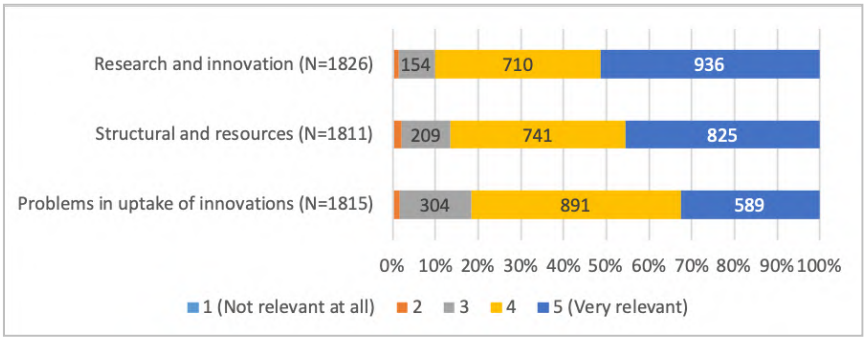
**Advantages mentioned:** Long term commitment, stability, and visibility in financial, legal, and strategic terms; Participation of wide range of relevant stakeholders in an ecosystem (large/small business, academics, researchers, experts, etc.); Complementarity with other (policy) initiatives at all levels EU, national, regional; Efficient and effective coordination and management; High leverage of (public) funds; Some innovative field require high levels of international coordination/standardisation (at EU/global level); Ability to scale up technology (in terms of TRL) through collaboration; Networking between members; Direct communication with EU and national authorities

**Disadvantages mentioned:** Slow processes; System complexity; Continuous openness to new players should be better supported as new participants often bring in new ideas/technologies that are important for innovation; Lower funding percentage compared to regular Horizon Europe projects; Cash contributions; Administrative burdens; Potential for IPR constraints.

### *1.2.4. Relevance of EU level to address problems in Partnerships' areas*

Respondents were asked to rate the **relevance of research and innovation efforts at EU level efforts to address specific problems in the area of partnerships**. Research and innovation related problems were rated as most relevant across all candidate initiatives, followed by structural and resources problems and problems in the uptake of innovations. Overall, all three areas were deemed (very) relevant across the partnerships, as more than 80% of respondents found these challenges (very) relevant. Only minor differences were found between stakeholder categories. Research and innovation problems were found slightly more relevant by academic/research institutions, yet slight less relevant by large companies and SMEs. Structural and resource problems were indicated as slightly more relevant by NGOs, but slightly less by academic/research institutions. While both NGOs and public authorities find slightly more relevant to address problems in uptake of innovation than other respondents. The views of citizens are not differing significantly. Respondents that are/were directly involved in a current/preceding partnership find, however, the need to address problems related to the uptake of innovations slightly more relevant than other respondents.

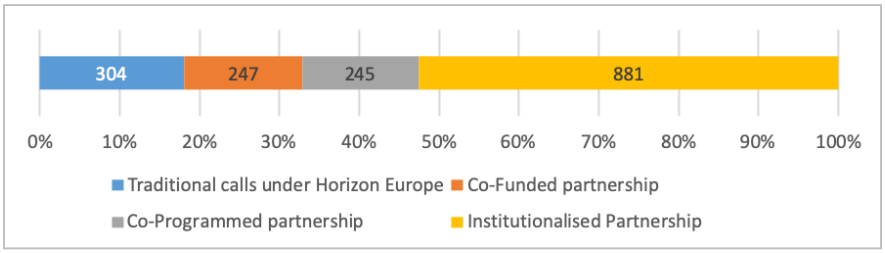
***Figure 9: To what extent do you think this is relevant for research and innovation efforts at EU level to address the following problems in relation to the candidate partnership in question? (non-campaign replies) Aggregation of responses of all candidate initiatives***



### *1.2.5. Horizon Europe mode of intervention to address problems*

Respondents were asked to indicate how these challenges could be addressed through **Horizon Europe intervention**. Just over 50% of all respondents indicated that institutionalised partnerships were the best fitting intervention, with relatively strong differences between stakeholder categories. The use of Institutionalised Partnership was indicated more by business associations and large companies, but less by academic/research institutions and SMEs. While academic/research institutions valued traditional calls more often, this was not the case for business associations, large companies and public authorities. Public authorities indicated a co-programmed intervention more often than other respondents. Citizens indicated slightly less often that institutionalised partnerships were the best fitting intervention. Respondents that are/were directly involved in a current/preceding partnership, selected the institutionalised partnership intervention in far higher numbers (nearly 70%).

***Figure 10: In your view, how should the specific challenges described above be addressed through Horizon Europe intervention? (non-campaign replies) For all candidate initiatives***




When asked to reflect on their answers, respondents that pointed to the need for using institutionalised partnership mentioned the long-term commitment of collaboration, a common and ambitious R&I strategy as well as the overall collaboration between industry and research institutions. Others shared positive experiences with other modes of interventions:

- Traditional calls, because of their flexibility and integration of a wide range of actors, as long as the evaluation panels do not deviate from the policy focus. This was mentioned by 94 participants, including companies (25), academics (26) and EU citizens (25).
- Co-funded partnership, as a mechanism to ensure that all participants take the effort seriously, while allowing business partnerships to develop. This approach was deemed suitable based on previous experiences with ERANETs. This was raised by 84 participants, 36 of them academic respondents, 18 companies and 16 EU citizens.
- Co-programmed partnerships, to tackle the need to promote and engage more intensively with the private sector. This was mentioned by 97 participants, most of them companies (34), followed by academics (22), business associations (15) and EU citizens (11).

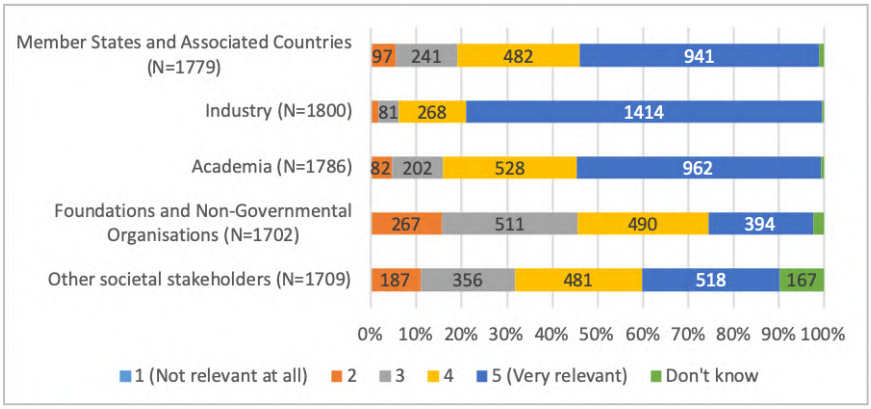
### *1.2.6. Relevance of a set of elements and activities to ensure that the proposed European Partnership would meet its objectives*

**<u>Setting joint long-term agendas</u>**

Respondents were asked how relevant it is for the proposed European Partnerships to meet their objectives to have a strong involvement of specific stakeholder groups in setting joint long-term agenda. All respondents see stakeholders from industry as the most relevant,

followed by academia and governments. The involvement of foundations and NGOs as well as other societal stakeholders were, however, still found to be (very) relevant by more than 50% of the respondents. Most respondents indicated the stakeholder group they belong to themselves or that represent them as relevant to involve.

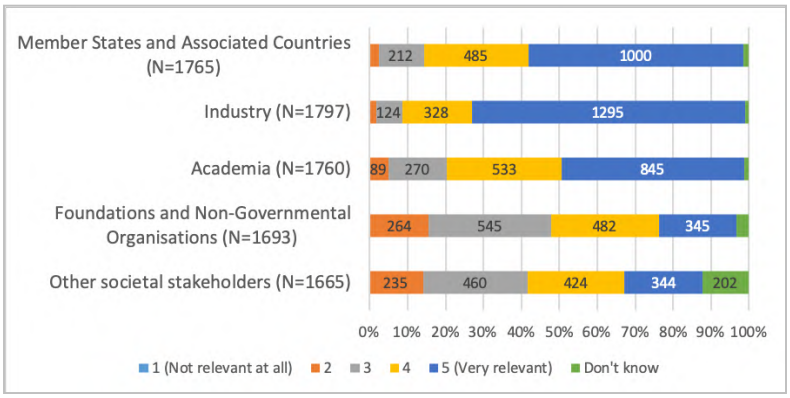
***Figure 11: In your view, how relevant are the following elements and activities to ensure that the proposed European Partnership would meet its objectives - Setting joint long-term agenda with strong involvement of: (non-campaign replies) For all candidate initiatives***




## Pooling and leveraging resources through coordination, alignment and integration with stakeholders

Respondents were asked how relevant it is for the proposed European Partnership to meet its objectives to pool and leverage resources (financial, infrastructure, in-kind expertise, etc.) through coordination, alignment and integration with specific groups of stakeholders. Respondents see stakeholders from industry as the most relevant, followed by academia and governments (Member States and Associated Countries). The involvement of foundations and NGOs as well as other societal stakeholders are also still found to be (very) relevant for more than 50% of the respondents. Similarly as described for the question on setting joint long-term agendas, most stakeholder categories valued their own involvement higher than other respondents – although also here differences between stakeholder categories were minor.

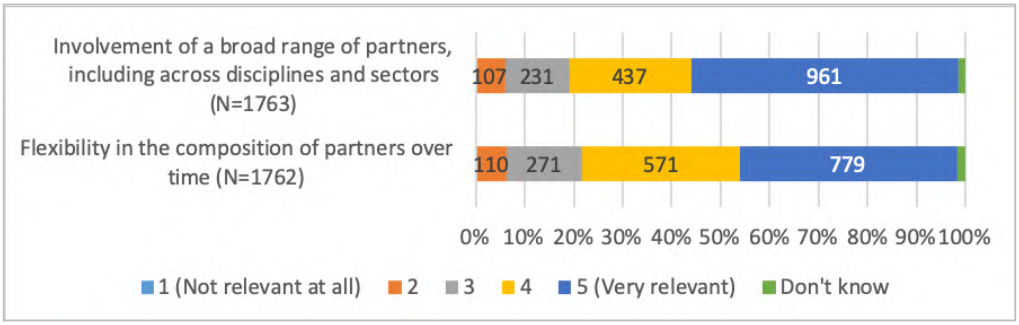
***Figure 12: In your view, how relevant are the following elements and activities to ensure that the proposed European Partnership would meet its objectives – Pooling and leveraging resources (financial, infrastructure, in-kind expertise, etc.) through coordination, alignment and integration with: (non-campaign replies) For all candidate initiatives***



## Composition of the partnerships

Regarding the composition of the partnership most respondents indicated that for the proposed European Partnership to meet its objectives the composition of partners needs to be flexible over time and that a broad range of partners, including across disciplines and sectors, should be involved (see Figure 13). When comparing stakeholder groups only minor differences were found. Academic/research institutions and public authorities found the involvement of a broad range of partners and flexibility in the composition of partners over time slightly more relevant than other respondents, while large companies found both less relevant. SMEs mainly found the flexibility in the composition of partners over time less relevant than other respondents, while no significant differences were found regarding the involvement of a broad range of partners. Citizens provided a similar response to non-citizens. Respondents that are/were directly involved in a current/preceding partnership, when compared to respondents not involved in a current/preceding partnership, indicated a slightly lower relevance of the involvement of a broad range of partners and flexibility in the composition of partners over time.

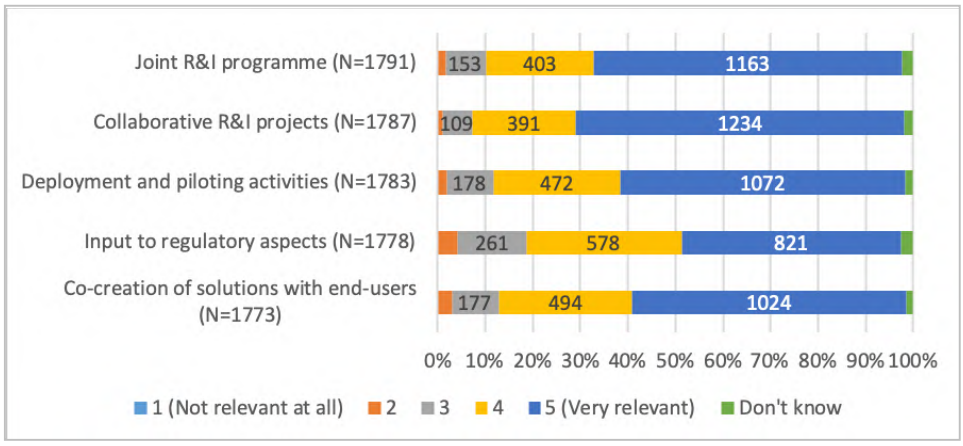
***Figure 13: In your view, how relevant are the following elements and activities to ensure that the proposed European Partnership would meet its objectives – Partnership composition (non-campaign replies) Aggregation of responses of all candidate initiatives***




## Implementation of activities

Most respondents indicated that implementing activities like a joint R&I programme, collaborative R&I projects, deployment and piloting activities, providing input to regulatory aspects and the co-creation of solutions with end-users are all (very) relevant for the partnerships to be able to meet its objectives. Minor differences were found between the main stakeholder categories, the differences found were in line with their profile. As such, academic/research institutions found joint R&I programme & collaborative R&I projects slightly more relevant and deployment and piloting activities, input to regulatory aspects and co-creation with end-users slightly less relevant than other respondents. For SMEs an opposite pattern is shown. Large companies, however, also found collaborative R&I projects slightly more relevant than other respondents, as well as input to regulatory aspects. The views of citizens are similar to non-citizens. Respondents that are/were directly involved in a current/preceding partnership, when compared to respondents not involved in a current/preceding partnership, show a slightly higher relevance across all activities.

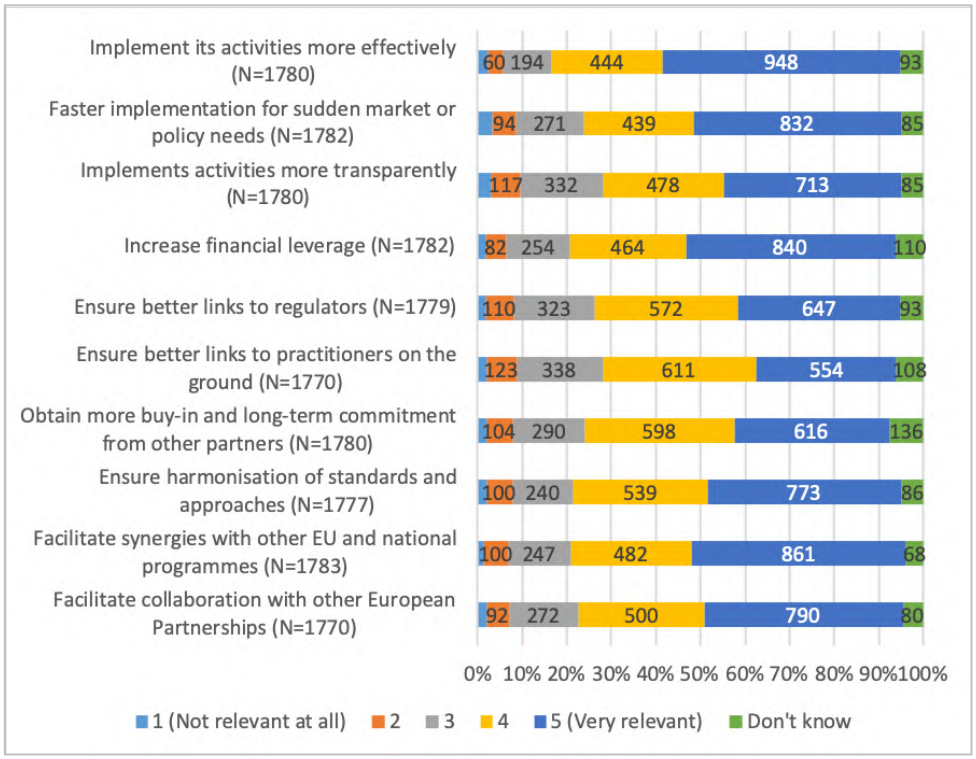
***Figure 14: In your view, how relevant are the following elements and activities to ensure that the proposed European Partnership would meet its objectives – Implementing the following activities (non-campaign replies) For all candidate initiatives***




### *1.2.7. Relevance of setting up a legal structure (funding body) for the candidate European Partnerships to achieve improvements*

Respondents were asked to reflect on the relevance of setting up a legal structure (funding body) for achieving a set of improvements, as shown in the Figure below. In general, 70%-80% of respondents find a legal structure (very) relevant for these activities. It was found most relevant for implementing activities in a more effective way and least relevant for ensuring a better link to practitioners on the ground, however differences are small.

***Figure 15: In your view, how relevant is to set up a specific legal structure (funding body) for the candidate European Partnership to achieve the following? (non-campaign replies) Aggregation of responses of all candidate initiatives***

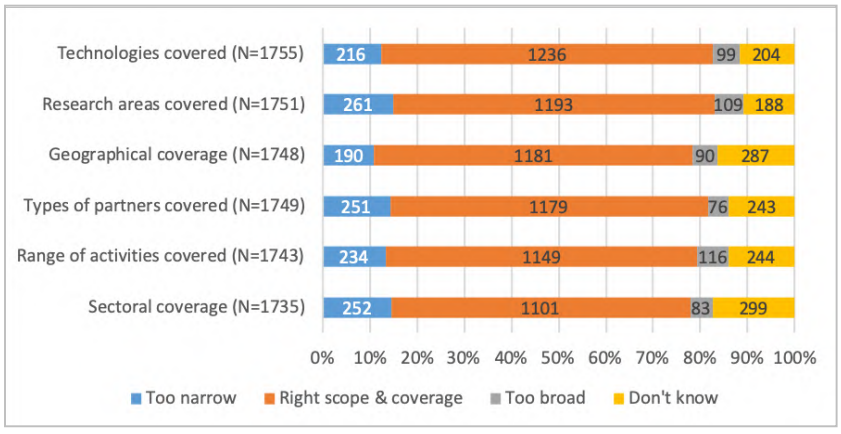


When comparing stakeholder categories there are only minor differences. Academic/research institutions indicated a slightly lower relevance for transparency, better links to regulators as well as obtaining the buy-in and long-term commitment of other partners. SMEs also indicated a lower relevance regarding obtaining the buy-in and long-term commitment of other partners. Large companies showed a slightly higher relevance for implementing activities effectively, ensure better links to regulators, obtaining the buy-in and long-term commitment of other partners, synergies with other EU/MS programmes and collaboration with other EU partnerships. NGOs find it slightly more relevant to implement activities faster for sudden market or policy needs. Public authorities, however, find it slightly less relevant to facilitate collaboration with other European Partnerships than other respondents. The views of citizens show a slightly lower relevance for a legal structure in relation to implementing activities in an effective way. Respondents that are/were directly involved in a current/preceding partnership indicated a higher relevance across all elements presented.

### *1.2.8. Scope and coverage of the candidate European Partnerships based on their inception impact assessments*

Consulted on the scope and coverage for the partnerships, based on their inception impact assessments, the large majority feels like the scope and coverage initially proposed in the inception impact assessments is correct. However, about 11% to 15% of the respondents indicated the scope and coverage to be too narrow. About 11%-17% of respondents answered "Don't know". Overall, differences between the main stakeholder categories were found to be minor. Academic/research institutions indicated slightly more often that the research area was "too narrow" then other respondents. SMEs on the other hand indicated slightly more often that the research area and the geographical coverage were "too broad". NGOs and public authorities, however, found the geographical coverage slightly more often "too narrow". Large companies found the range of activities slightly more often "too broad" and the sectoral focus slightly more often "too narrow" when compared to other respondents. The views of citizens are the same as for other respondents. Respondents that are/were directly involved in a current/preceding partnership more often indicated that the candidate institutionalised European Partnership have the "right scope & coverage".

***Figure 16: What is your view on the scope and coverage proposed for this candidate institutionalised European Partnership, based on its inception impact assessment? (non-campaign replies) Aggregation of responses of all candidate initiatives***



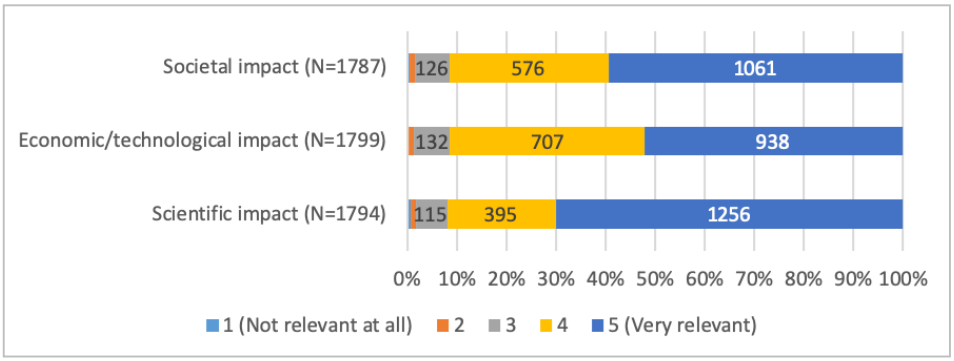
### *1.2.9. Scope for rationalisation and alignment of candidate European Partnerships with other initiatives*

When asked whether it would be possible to rationalise a specific candidate European Institutionalised Partnership and its activities, and/or to better link with other comparable initiatives, nearly two thirds of respondents answered "Yes" (1000, or 62%), while over one third answered "No" (609, or 39%). Nearly no differences were found between stakeholder categories, only large companies and SMEs indicated slightly more often "Yes" in comparison to other respondents. The views of citizens are the same as for other respondents. Respondents that are/were directly involved in a current/preceding partnership, indicated "No" more often, the balance is about 50/50 between "Yes" and "No" for this group.

### *1.2.10. Relevance of European Partnerships to deliver targeted scientific, economic/technological and societal impacts*

Finally, respondents were asked to rate the relevance of partnership specific impacts in three main areas: Societal; Economic/technological; and Scientific impacts. All three areas were deemed (very) relevant across the candidate partnerships. Scientific impact was indicated as the most relevant impact, more than 90% of respondents indicated that this as (very) relevant. Only minor difference between stakeholder groups were found. Academic/research institutions found scientific impacts slightly more relevant, while large companies found economic and technological impacts slightly more relevant than other respondents. NGOs found societal impact slightly more relevant, while SMEs found this slightly less important. Citizens did not a significantly different view when compared to other respondents. Respondents that are/were directly involved in a current/preceding partnership find all impacts slightly more relevant than other respondents.

***Figure 17: In your view, how relevant is it for the candidate European Institutionalised Partnership to deliver on the following impacts? (non-campaign replies) Aggregation of responses of all candidate initiatives***



## 1.3. Stakeholder consultation results for this specific initiative

### *1.3.1. Feedback to the inception impact assessment on candidate initiatives for Institutionalised Partnerships*

Following the publication of the inception impact assessment, a feedback phase of 3 weeks allowed any citizen to provide feedback on the proposed initiatives on the "Have your say" web portal. In total 340 feedbacks were collected for all initiatives.

For the initiative "Circular Bio-Based Europe" 19 individual feedbacks were collected, mainly from businesses (2 responses), business associations (6 responses), academic institutions (5 responses, including 2 anonymous), public authorities (3 responses) and NGOs (3 responses).[5] Among the elements mentioned were:

- Eight stakeholders (all businesses, two business associations, three academic institutions, one NGO and two public authorities) welcomed the integration of circular economy objective and highlighting the high relevance of the circular economy topic in the context of biobased industries
- Eight stakeholders (all businesses, some business associations, over half academic institutions, one public authority) commented on the model of the new initiative and welcomed the Institutional Partnership model. Comments included that this model represents the deepest level of integration and engagement; that it is the best way forward as it will contribute to longevity and sustainability, through integration, engagement. Some mentioned positive experience and the proven efficiency of the current Bio-based Industries Joint Undertaking structure. Some stakeholders commented on the commitment issue, and noted that only IP provides the legal means to ensure the private partner meets a defined minimum level of commitments.
- One public authority stakeholder while supporting the IP model, commented on importance of assuring an appropriate governance model that is aligned with the public interest, industry needs and the needs of other key stakeholders such as primary producers and end users. They suggest that the role of the MS in the governance is strengthened including via synergies with national programmes, more open process of programme topic generation, information sharing with the MS as in other parts of Horizon, transparency on the real (in-kind and in-cash) contributions actually provided by industry.
- One stakeholder from NGO sector criticized the models of public-private partnerships (ETPs, JTIs, JUs) with industry having an increasing say in determining strategic research agendas and promoting own needs at the expense of EC funds.
- Several stakeholders suggested to ensure that thematic coverage included additional topics as listed below:
  - Three stakeholders commented on importance of inclusion of *bioenergy* sector in the sectorial coverage of the new initiative, commenting that it can also contribute to the circular economy and its synergies with other bio-based sectors.
  - There stakeholders from business, business associations and regional government, stressed the relevance of *wastewate*r in the circular bio-based economy as an important source of nutrients and chemicals
  - One association extensively argued about importance of promoting R&I on *plant-based proteins* under the new initiative.

[5] Feedback on inception impact assessment to be found on https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2019-4972449/feedback_en?p_id=5722347

- One business association suggested to include a focus on *renewable gases* from agricultural waste in the topical scope of the initiatives.

- Two stakeholders (from academia and NGO), highlighted the importance to consider environmental impact of creating new demand for biomass (e.g. food security, impact on ecosystems, resource conflicts outside EU), and ensure maintenance or improvement of biodiversity.

#### *1.3.2. Structured consultation of the Member States on European partnerships*

A structured consultation of Member States through the Shadow Strategic Configuration of the Programme Committee Horizon Europe in May/ June 2019 provided early input into the preparatory work for the candidate initiatives (in line with the Article 4a of the Specific Programme of Horizon Europe). This resulted in 44 possible candidates for European Partnerships identified as part of the first draft Orientations Document towards the Strategic Plan for Horizon Europe (2021-2024), taking into account the areas for possible institutionalised partnerships defined in the Regulation.

The feedback provided by 30 countries (all Member States, Iceland and Norway) has been analysed and summarised in a report, with critical issues being discussed at the Shadow Strategic Programme Committee meetings.

We can summarise the findings of the report in 6 main takeaways:

- **Overall positive feedback on the proposed portfolio, but thematic coverage could be improved**

The results indicate a high level of satisfaction with the overall portfolio, the level of rationalisation achieved, and policy relevance. While delegations are in general satisfied with the thematic coverage, the feedback suggests the coverage could be improved in cluster 2 “Culture, creativity and inclusive society” and cluster 3 “Civil Security for Society“.

- **Large number (25) of additional priorities proposed for partnerships by delegations**

Despite high satisfaction with the portfolio and candidates put forward by the Commission, countries put forward a high number of additional priorities to be considered as European Partnerships. A closer examination suggests that these additional proposals are motivated by very different reasons. Whilst some proposals are indeed trying to address gaps in the portfolio and reach a critical mass, then, others are driven by the wish to maintain existing networks, currently not reflected in the Commission proposal (e.g. those based on JPIs, ERA-NETs). In addition, some proposals reflect worries over some topics not being sufficiently covered in the existing proposals, but could be possibly well covered within the scope of existing partnerships, or by traditional calls under the Framework Programme.

- **Critical view on the high number and openness of Joint Undertakings**

Country feedback suggests dissatisfaction with the high number of proposed Article 187 TFEU partnerships. Notably smaller as well as EU-13 countries raise concerns with regards to the potential insufficient transparency and openness of the partnership model. In the feedback, countries either directly support or ask to carefully analyse whether the objectives of this proposal could be reached with the co-programmed model.

For those partnerships that will be set up on the basis of Article 187, the country feedback stresses the need to ensure a clear shift towards openness in the governance, membership policy and allocation of funding of these partnerships. Notably, it is emphasised that the JU rules should not have any limitations or entry barriers to the participation of SMEs and other partners, including from academia.

Although the feedback suggests a general criticism, there are few concrete and broadly supported proposals, including to reduce the number of institutionalised partnerships mergers or by alternative implementation modes.

- **Lack of cross-modal perspective and systematic approach to mobility**

The current proposal foresees 5 partnerships in the area of transport (for rail, air traffic management, aviation, connected and automated driving, zero-emission road transport), and 2 that in closely related technologies for radically reducing carbon emissions (hydrogen, batteries). Several delegations would wish to see a systemic approach to developing mobility and addressing related challenges (optimisation of overall traffic, sustainable mobility solutions for urbanisation), and do not support a mode-dependent view only. This suggests the need to discuss how to ensure greater cooperation between transport modes and cross-modal approaches in establishing partnerships in the area of mobility.

- **Partnership composition: the role of Member States in industry partnerships**

The composition and types of partners is an important element for the success of a partnership, e.g. to ensure the right expertise and take-up of results. Ensuring broad involvement without overly complicating the governance of the partnership remains an important an important challenge in the design of future partnerships.

In the feedback, several Member States express their interest to join as a partner in partnerships that have traditionally been industry-led. However, individual comments suggest there are different views on what their involvement means in practice, with some countries expressing readiness to commit funding, while others support limiting their involvement to alignment of policies and exploiting synergies. This suggests the need to discuss further what the involvement of Member States means in practice (notably in terms of contributions, in the governance), and what would be possible scenarios/options in Horizon Europe. There is special interest in testing and deployment activities, in synergies with Cohesion Funds and CEF priorities and investments.

Although it is too early to determine the interest of industry/ businesses in the topics proposed for partnerships where the main partners are public authorities, their involvement in in public centric partnerships will also be an important question in the design and preparation of future proposals.

- **Some proposals are more mature than others**

The analysis of feedback per partnership candidates suggests that some proposals are more mature, while others would need more time to determine the scope, objectives, partner composition and contribution and appropriate mode of implementation. This relates to in particular to partnerships with no predecessors and those where the main partners are public. It suggests that the proposals would need to be developed at different paces in order to achieve good quality, and thus, not all partnership proposals may be ready for implementation at the start of Horizon Europe.

For the initiative “Circular Bio-Based Europe” the following overall feedback was received from Member States. Delegations identified a number of aspects that could be reinforced in the proposal for the "Circular Bio-based Europe" partnership that would increase its relevance for national priorities. They suggest e.g. to broaden the scope towards forestry, waste and marine bio-resources; to give more emphasis to local production of biomass and to create opportunities for the development of local small-scale technological solutions for rural regions and urban areas. The proposed use of Article 187 is supported by 26%, but also questioned by 26% of the responses, with 48% requiring more information. Overall the results of the Member State consultation confirm strongly the high relevance of the proposed European partnership for a Circular bio-based Europe. While 43% of the countries are undecided at this stage, 15 have expressed an interest to participate (BE, DE, ES, FI, FR, CR, HU, IE, IT, MT, NL, RO, SE, SK, SI), and only one country has at this stage expressed that there is no national interest to participate (IS). Overall there is a strong agreement (96%) on the use of a partnership

approach for a Circular bio-based Europe and a broad agreement (83%) that the partnership is more effective than traditional calls in achieving the objectives and delivering clear impacts for the EU and its citizens. The majority of countries indicate good agreement with the proposed objectives at short, medium and long term and the expected scientific, economic and societal impacts at European level.

### *1.3.3. Targeted consultation of stakeholders*

In addition to the consultation exercises coordinated by EC services, the external study thematic teams performed targeted consultations with businesses, research organisations and other partners on different aspects of potential European Partnerships.

**Approach to the targeted consultation**

The objectives of the interviews in the context of this impact assessment was to collect view of people on the following topics:

- Overall and specific objectives that the potential Circular bio based partnership/initiative could address
- Target groups, membership and openness
- Role and activities of the initiative
- Leverage effect in the potential partnership
- Coordination, structuring and mobilisation needs
- Key Performance Indicators (KPI)
- Costs and benefits of the potential initiative
- Need for a Circular bio-based Europe
- Research needs
- Contribution to EU policies
- Governance / organisation
- Collaborations with other initiatives
- Benefits of EU action

The selection of interviewees was discussed with the steering committee members. The key point was to approach the actors who are well informed about the ongoing partnership work either by being involved in projects, governance board or cooperation activities. A few companies not involved in the current partnership activities have also been approached. Description of the categories of actors interviewed is made in the next section.

The potential interviewees were contacted by email invitations that included the explanation of the context of the assignment, letter of support from the EC and the interview guide with a list of topics and relevant questions to be discussed (provided in the annex report). The interview guide (referred as the questionnaire) contained 50 questions divided by sections mentioned above.

The interviewees were given a freedom to use the interview as a guidance for the interview discussions and not forced to address all questions and topics presented here. In many cases the interview was organised by topical sections, in a few cases interviewees structurally followed question by question in providing their answers. Some interviewees preferred to provide written answers to the questionnaire. Finally, the interviewees were guaranteed their anonymity.

**Overview of respondents to the targeted consultation**

In total, 63 interviews have been conducted. However, that number does not correspond to the actual number of individuals interviewed since group interviews were also conducted with actors belonging from the same stakeholder category.

Moreover, situations were found where actors were belonging to several stakeholder categories, i.e. actors managing a BBI JU Flagship project could also be present in the BBI JU Team and Governing Board category. To avoid duplicates, such situations were resolved by allocating the individuals to their "main" category. That means that from one single interview, multiple visions and experiences could be collected[6].

In total, 14 stakeholders categories were established as follow:

- The European Commission
- Member States with a bioeconomy strategy
- Member States without a bioeconomy strategy
- Regions
- BBI JU Team and Governing Board
- BBI JU Flagship
- BBI JU Other projects
- Companies BBI JU related
- Companies not BBI JU related
- Other Initiatives
- Business and industry associations
- NGOs and consumer associations
- Research and RTOs
- Experts

## Key results/messages from the targeted consultation

The main findings of the interviews have been described by sections. Some sections received less input than others since they were more technical and required specific knowledge on the subject, which some actors did not have to provide relevant answers. Some sections received more input, such as the "objectives" section, which proved successful in generating enthusiasm and opinions from the interviewees and did not require technical knowledge.

**Objectives**

In general, interviewees were agreeing with the objectives of the future initiative, however, many of them stipulated that in the future initiative, the objectives should be more focused, and the scope should be enlarged to be more open to more sectors (e.g. waste management, food, soil etc.) and cover value chains that have not been covered before, such as for example plant based proteins. More emphasis should also be put on the circularity and on the environmental sustainability aspect of the objectives, as well as on the socio-economic aspect including the creation of jobs and growth, especially in rural areas and remote and economically vulnerable regions. Some interviewees suggested to link the objectives with the SDGs and to take a more regional perspective in that regard.

Creating a market for the bio-based economy and bringing products to commercialization were objectives often suggested by many stakeholders coming from different categories. In that path, a higher focus on improving the competitiveness of the EU industry was mentioned.

[6] For further details on distribution statistics, see also the supporting study by Technopolis (2020).

According to the majority of the interviewees such objectives should be set and defined upfront, with a degree of flexibility, by the European Commission and the industry in a collaborative manner. A few interviewees suggested to leave that role for the European Commission only or for the industry only. However, many stakeholders suggested to involve more actors in the process such as primary producers, farmers, universities, member states, public and local authorities, regions, small cooperatives and SMEs. The importance of the role (consultative or full decision-making power) of each actor mentioned depended on the type of stakeholder category interviewed. Nonetheless, a point of agreement was found on having a balance between all actors in order to not have smaller actors eclipsed by the bigger ones. Such a balance was also mentioned when addressing the TRL levels that should be emphasized: some respondents said that the initiative should not exclude any TRL levels and have a balance of focus, while others said to focus mostly on higher TRL projects as they can bring impact much faster than the lower TRL projects. Yet, others suggested to focus mostly on lower TRL levels in order to not impede innovation. Another suggestion was made on involving the public and the consumers and informing them better about the bio-based economy and bio-based products. This consideration was generally linked to creating a market for bio-based products and related objectives.

Arguments regarding the different options varied greatly among the different stakeholder categories and can be exposed as such:

- A CPP is considered lighter, more flexible and as giving more influence to the EC. However, as it is less dependent on industry contributions and not requiring legally binding commitment, it also might generate less engagement with stakeholders and make it more difficult to stimulate industry who consider that the EC has too much say. Moreover, some consider that CPP will not allow long-term projections and will not have balanced representation of various TRLs in the overall project portfolio of the initiative.
- A CFP is depicted as problematic since it does not envisage involvement of the private sector in the initiative. Nonetheless, member states would have more weight which is considered as benefiting for some but creates the drawback of focusing too much on academic topics of research, therefore not sufficiently promoting innovations close to market and reflect industry needs.
- An IPP has been described as administratively more regulated and therefore less flexible in governance and other rules, difficult to steer and less inclusive/largely industry driven in the decision-making on the content of the work programme. However, it is considered very efficient in structuring very diverse sectors around bio-based value chains and bio-economy, as well as being the best option to cross the valley of death, boost the bio-economy and bring products to the market. The IPP is said to generate a higher engagement and commitment of industry (however many mentioned that the rules about commitments should focus on project level contributions and rather than on the programme level in order to secure industries interest and commitment), allows collaboration with other sectors and serves as a bridge between private actors and the EC. This option has a long-term approach and gives the predictability needed.

Some participants also explained that changing the structure of the potential initiative would create negative impacts and would lose the impetus. A statement often expressed is to have an improved version of the BBI JU, isolated suggestions for a “hybrid model” that would combine the flexibility of CPP and a strong back office/secretariat team from the IPP model.

Regarding the definition of the target groups, the panel agreed on having flexibility on the coverage of the target groups while keeping a degree of stability to ensure the sufficient involvement of actors. However, the interviewees suggested to include more stakeholders of the bio-economy in the future

initiative; therefore expressing a need to redefine the target group coverage. Groups that have been the most mentioned were SMEs, regional and local authorities, biomass producers and primary producers, members states, universities, academia, NGOs, citizens and consumers.

The majority of the interviewees expressed an interest to have open calls instead of closed calls to ensure innovation and competitiveness. However, suggestions have been made to have more focused calls and have calls only for small-size actors such as SMEs, who should also have a special status. Only a few suggested foreseeing a priority in the calls for the members, which implies to have a differentiation between members and non-members. Some stakeholders also expressed the need to have earmarked funding for Eastern and Central Europe countries.

Regarding the engagement on research priorities, different views were voiced. A lot of the interviewees suggested to involve more actors such as SMEs, NGOs, universities and regional and local actors in the advisory board. Some suggested having academia and industry leading the research priorities, others found it to be the role of the industry with the involvement of member states in order to align on national strategies. Others expressed an interest in including brand owners in the initiative, to get a close-to-market perspective and focus.

Regarding the different options for the future initiative, it has been expressed that CPP would be better suited for member states who would have a bigger influence, on the other hand CPP is depicted as not attractive for non-traditional bio-economy sectors who would not engage. However, IPP has been described as having more capacity to involve and represent more actors.

**Roles and activities**

An argument that has been expressed by many interviewees was to have a common understanding of the initiative, to have a clear methodology and definitions set beforehand. However, a clear interest has been expressed toward keeping a certain flexibility in the definition of the role and activities of the initiative, while stability was also considered a necessity.

The proposed role and activities were globally approved by the majority of the interviewees, nonetheless, updating the objectives and expanding the scope of the activities was a clear requested. It was suggested to have activities addressing new technologies in the annual work programme, to promote technology transfer and dissemination, establish network and awareness raising activities, create more and more ambitious CSA and be more involved in smaller entrepreneurial actions. Moreover, more administrative activities were suggested such as establishing a control mechanism and a follow-up board.

Regarding the different options for the future initiative, CPP has been described to have the potential to allow evolving objectives and activities, while the IPP has been considered as too rigid in this respect. However, the was found to IPP generate more visibility and has a dedicated service for activities.

**Leverage effect**

The subject of the leverage effect has sparked a lot of different opinions and views. Among them an agreement has been found on the difficulties to generate in-cash contributions either from the big industries or from the smaller industries. For the big industries, it has been considered impossible and delusional to get them to contribute to a “common pot” without them knowing in advance what they will get in return for their contribution. This has been described as “paying for the competition”. The same perspective was applied to the smaller actors, with the situation being even more complex as they often do not have the financial means. In-cash contributions have therefore been described as difficult. However, some expressed that in-cash was required from industries since the in-kind contribution is a way of circumventing co-financing. Others expressed that both contributions should be requested. Nonetheless, the commitment of industry was considered a necessity.

It has also been mentioned that the EC should be defining the requirements of contributions, and do it in advance. Moreover, some interviewees voiced that the commitment from companies depends on the commitment of the EC: the stronger the commitment of the EC, the stronger the commitment from companies. Another way considered to increase the leverage effect is to focus on high TRL projects, or on mid to later stages projects.

The IPP has been considered better placed to increase the leverage effect as it involves stable partners and has the potential to build momentum.

**Coordination, structuring and mobilisation**

It has been agreed among the panel that the coordination between and across sectors is important and required for the bio-based industry. It makes sense to mobilize and coordinate actors such as smaller stakeholders, SMEs, primary producers, regions, local authorities, member states, academia, end users, brand owners etc.

It has been mentioned that the IPP might be the best option to achieve the coordination, structuring and mobilisation objectives as this option is able to inform, mobilize primary sectors, create robustness of value chains and thus, generate cooperation across sectors. However, others stipulated that the coordination with academia should be done by Horizon Europe and not by the initiative. It has also been mentioned that the structuring effect requires cooperation with the policy level to be fostered. Added to that, since structures already exist within the current partnership, a continuation should be envisaged.

**KPIs**

Regarding the KPIs, a lot of suggestions have been made by the interviewees to include more and broader topics. First of all, it has been suggested to define the KPIs in advance and establish a more thorough definition, as the KPIs are sometimes too abstract and not easily translatable. In addition, a clearer method to assess the KPIs was requested. Then, a qualitative approach instead of a quantitative approach was described as more suited for the KPIs.

Regarding the subjects in particular, among the suggestions made, one could find to better link the KPIs with the SDGs, to have KPIs related to climate, to sustainability, to regional participation, to jobs, growth etc. It was also mentioned to link the KPIs with the number of flagships, with the products arriving on the market, with the commercialised technologies, with new value chains etc.

**Costs and benefits**

Regarding the costs and benefits, the CPP option has been described as cheaper and lighter than the IPP option. However, in the CPP the costs of development are deferred, so it might be that the costs of CPP and IPP will be the same when considering all costs. Moreover, it appears that CPP is too subjective on contributions, which is not the case in the IPP. Indeed, as the commitment of industry is considered as required and crucial, it should be ensured through legally binding commitment. In addition, an IPP appears to give the predictability needed, pairing with the opinion of a lot of interviewees stipulating that long-term funding is required for the initiative. In that regard, an issue pointed out was the lack of continuity, which led some interviewees to stipulate that follow up of investments is more important than financial contribution itself. Thus, a proper monitoring system has been suggested.

On the other hand, it has been advised to reduce bureaucracy, simplify reporting, achieve more with the same amount of contributions and creating a lighter structure of organization.

**Need for Circular bio-based Europe**

Regarding the timeframe of the EU partnership on Circular bio-based Europe, an agreement has been found among the panel for a long-term period, going from 7 to 10 years to sometimes as long as possible. Others suggested that it should match the financial framework, or to stop the initiative when it is not contributing to EU policy anymore.

A clear need towards the future initiative has been expressed by the majority of the interviewees. Without an initiative, investments in bio-based industry might happen outside the EU, therefore not ensuring EU's competitiveness. Moreover, the development of the industry might be much slower and the cooperation between different actors and sectors might not happen.

According to the panel, an initiative is needed to provide support, to encourage the intersectoral and value chain cooperation, to deliver EC's objectives, to promote social and sustainable ideas and support eco-innovation. In addition, the partnership is considered as having a facilitating role in the bio-based industry.

**Research needs**

Concerning the research needs and the process for setting priority research topics, different views have been expressed. The first view mentioned that the EC should be the main actor to set the agenda, a second view suggested to have the EC deciding in collaboration with industry. However, the role of the industry in this collaboration varied from a full collaboration to only being heard by the EC. A third view suggested to have the private sector to lead the research agenda and controlled by the university. Others said that there should be a balance between the actors, which led the interviewees to suggest involving more stakeholder in the process of setting up the research priorities such as primary producers, the EU13 countries, to engage more the SRG and the scientific committee.

In addition, the topics of the research priorities have been subject to some improvements to be closer to market, to focus on higher value products and commercialisation and on higher TRL projects. Nonetheless, is has been mentioned that the research agenda should come from the need to achieve environmental targets of the EC and address the societal challenges as well.

**Contribution to EU policies**

The future initiative might be contributing to the EU policy objectives by promoting and raising awareness about the bio-based industry, promoting existing standards or labels but also by de-risking investment and filling the funding gap in the industry. In that regard, the future initiative needs to accompany the industry and producers in promoting bio-based products. It might also accelerate the market uptake of solutions to contribute to the EU policy objectives by collaborating with and involving smaller stakeholders such as SMEs and consumers.

It has been recognised that policy had to change and that it is benefiting to have projects followed up by policies measures. It has been considered crucial to monitor how the future initiative will be contributing to EU policies objectives.

Regarding the options of the future initiative, an IPP is considered suited to promote and raise awareness, however it is less flexible and it has been mentioned that the EC has minor access to information. CPP has been considered easier by few interviewees.

**Governance/organisation**

Regarding the governance of the future initiative, it was suggested to involve many new actors. Member states, as a potential actor, have been sparking the most diverging opinions; some interviewees said member states should be involved others were opposing their involvement since if they do not speak with one voice it would create confusion, others suggested to communicate with them instead of involving them closely. In addition, universities, academia and research institutes were mentioned as actors to be included, as well as public services who should get a better representation.

Interviewees urged to give SMEs a better representation and participation which might be best guaranteed by the IPP. It has been also advised to look at the possibilities for regions to participate.

Openness and flexibility, according to the panel, should be secured for new key actors, member states, partners and target groups. For example, a flexibility for smaller actors in terms of time should be accorded. However, in some instances the inclusion of international actors in the initiative was not deemed appropriate..

**Collaboration with other initiatives**

Collaboration with other initiatives has been described as important but sometimes difficult. Collaboration might scale out synergies and might be optimising efforts through synergies, which is considered as important. Collaboration with national and regional levels has been suggested, however collaboration with international level sparked less enthusiasm as it is harder even if considered valuable since it can bring technologies from the outside to the EU.

Collaboration with NGOs, smaller developers, brands, agri business and citizens has been mentioned as having a role to play. Establishing links with other public and private partnerships were suggested to cover potential overlaps, and collaboration with initiative like CAP, SPIRE and others have also been described to be beneficial.

**Benefits of EU action**

According to the panel, an EU initiative is needed for the bio-based industry since the industry is considered too young to develop by itself. In addition, the EU initiative has a structuring effect and is thus needed to drive and coordinate multiple stakeholders. The following arguments on the necessity to have an EU initiative were put forward; bridging the valley of death, de-risking, advances on R&D, bringing incentives to operate in the EU, ensuring EU's competitiveness etc.

In that regard, some have expressed the need for an IPP, while others said that CPP might be too light to ensure the objectives and overcome the potential barriers.

### *1.3.4. Open Public Consultation*

## APPROACH TO THE OPEN PUBLIC CONSULTATION

The consultation was open to everyone via the EU Survey online system[7]. The survey contained two main parts and an introductory identification section. The two main parts collected responses on general issues related to European partnerships (in Part 1) and specific responses related to 1 or more of the 12 candidate initiatives (as selected by a participant).

The survey contained open and closed questions. Closed questions were either multiple choice questions or matrix questions that offered a single choice per line, on a Likert-scale. Open questions were asked to clarify individual choices.

The survey was open from 11 September till 12 November 2019. The consultation was available in English, German and French. It was advertised widely through the European Commission's online channels as well as via various stakeholder organisations.

The analysis of the responses was conducted by applying descriptive statistic methods to the answers of the closed questions and text analysis techniques to analyse the answers of the open questions. The

[7] https://ec.europa.eu/eusurvey/runner/ConsultationPartnershipsHorizonEurope

keyword diagrams in this report have been created by applying the following methodology: First, the open answer questions were translated into English. This was followed by cleaning of answers that did not contain relevant information, such as "NA", "None", "no comment", "not applicable", "nothing specific", "cannot think of any", etc. In a third step, common misspellings were corrected, such as "excellence" instead of "excellence", or "partnership" instead of "partnership". Then, then raw open answers were tokenised (i.e. split into words), tagged into parts of speech (i.e. categorised as a noun, adjective, preposition, etc.) and lemmatised (i.e. extraction of the root of each word) with a pre-trained annotation model in the English language. At this point, the second phase of manual data cleaning and correction of the automatic categorisation of words into parts of speech was performed. Finally, the frequency of appearance and co-occurrences of words and phrases were computed across the dataset and the different sub-sets (e.g. partnerships, stakeholder groups). Data visualisations were created based on that output.

The keyword graphs in the following sections have been built based on the relationships between words in the open responses of the survey participants. It features words that appear in the same answer either one after the other or with a maximum distance of two words between them. Each keyword is represented as a node and each co-occurrence of a pair of words is represented as a link. The size of the nodes and the thickness of the links vary according to the number of times that keywords are mentioned and their co-occurrence, respectively. In order to facilitate the visualisation of the network, the keyword graphs have been filtered to show the 50 most common co-occurrences. Although the keywords do not aim to substitute a qualitative analysis, they assist the identification of the most important topics covered in the answers and their most important connections with other topics, for later inspection in the set of raw qualitative answers.

### *1.3.5. Relevance of a set of elements and activities to ensure that the proposed European Partnership would meet its objectives*

**Setting joint long-term agendas**

Respondents were asked how relevant the involvement of actors is in setting joint long-term agenda to ensure that the proposed European Partnership would meet its objectives (see Figure 23). The highest amount of respondents indicated that the involvement of Industry is 'very relevant'. A large part of respondents also indicated that the involvement of Academia and Member States and Associated Countries is 'very relevant'. The answers are more evenly split with regard to Foundations and NGOs and Other stakeholders.

Academic/research institution, as well as EU citizen and public authorities indicated that the involvement of Industry and Academia are 'very relevant' followed by Member States and Associated Countries and Foundations and NGOs as the second choice. Business association indicated that the involvement of Industry and Member States, Associated Countries and Academia is the most relevant, however Foundations and NGOs in turn is the least important. SMEs and businesses (250+) indicated similar preferences in the OPC, where the involvement of Industry and Member States and Associated Countries is the most relevant, the least relevant is involvement of Foundations and NGOs. NGOs think that the engagement of Industry and Foundations and NGOs will contribute the most.

***Figure 23: In your view, how relevant are the following elements and activities to ensure that the proposed European Partnership would meet its objectives? - Responses for the Circular Bio-based Europe Initiative - Setting joint long-term agenda with strong involvement of***

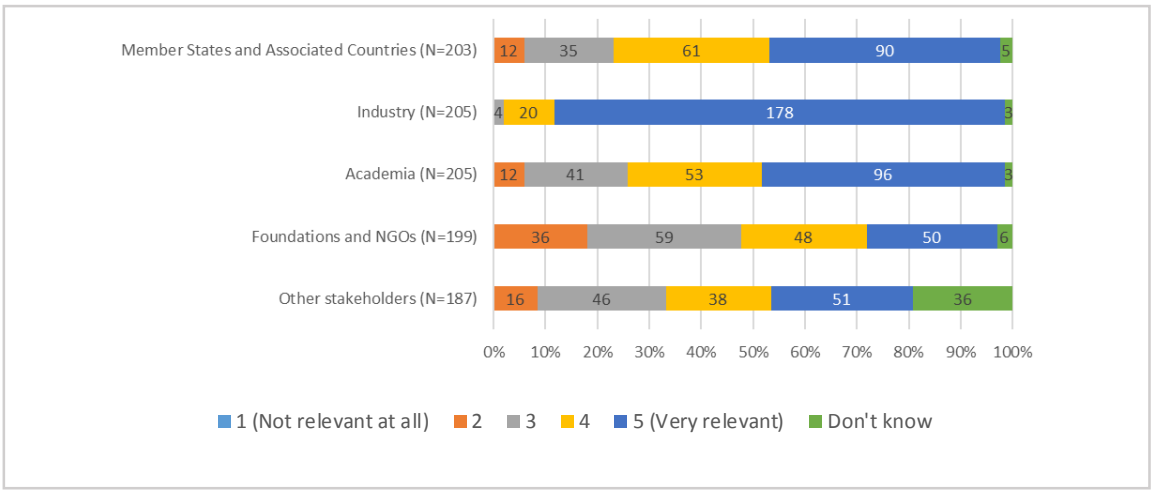
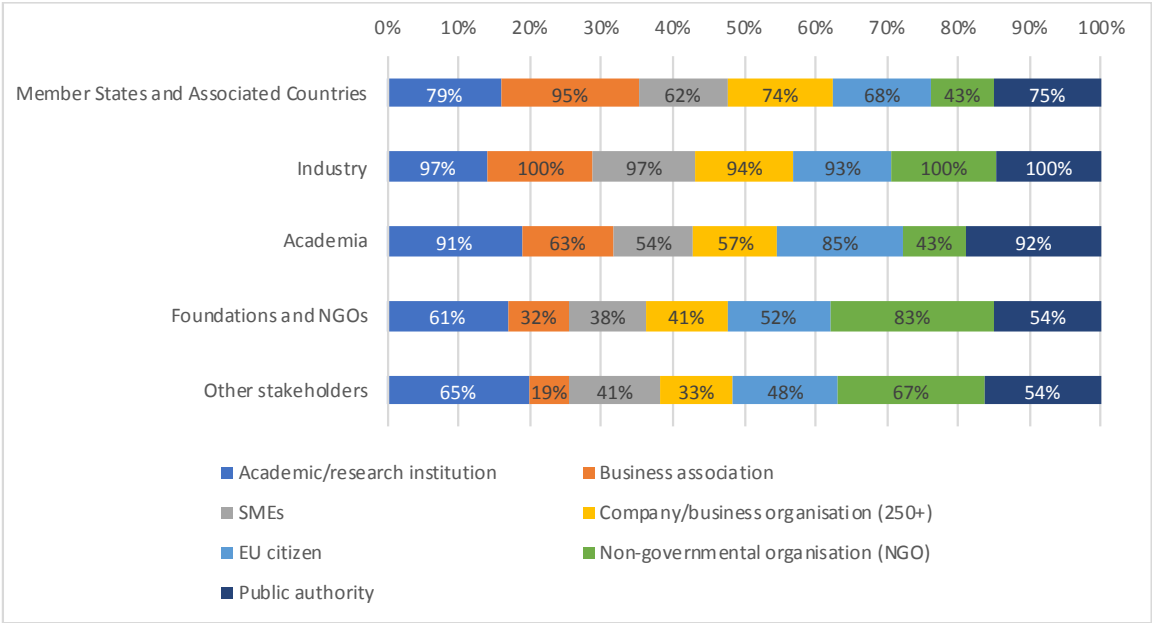



***Figure 24: In your view, how relevant are the following elements and activities to ensure that the proposed European Partnership would meet its objectives? - Responses for the Circular Bio-based Europe Initiative - Setting joint long-term agenda by stakeholder type with strong involvement of***



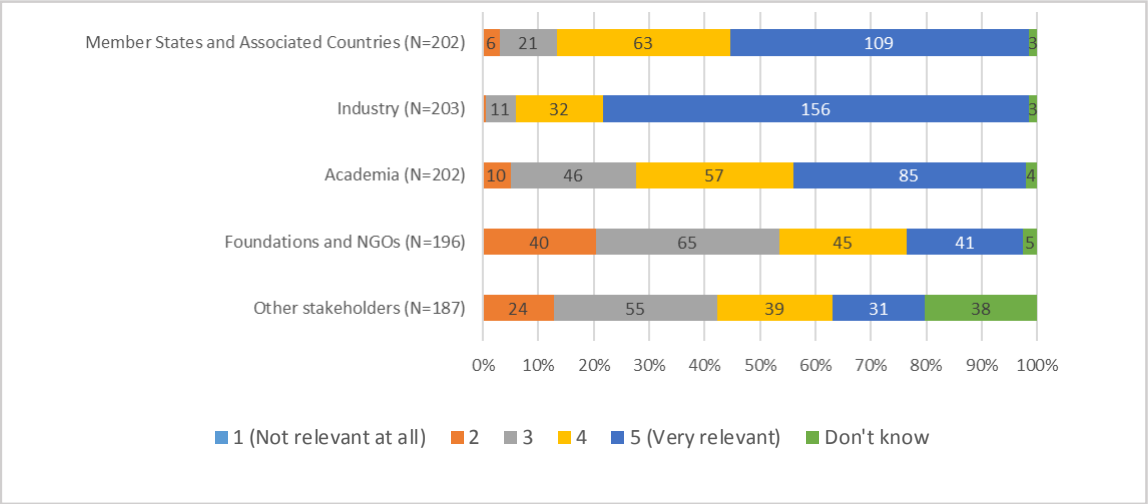

## Pooling and leveraging resources through coordination, alignment and integration with stakeholders

With respect to the relevance of coordination, alignment or integration with specific stakeholders' groups in pooling and leveraging resources, such as financial, infrastructure, in-kind expertise etc., to meet Partnership objectives, the patterns are very similar. More than two third of respondents in all stakeholder groups indicated that industry was very relevant. Member States and Associated Countries were very relevant for business associations, Academic/research institution, EU citizen and Public authority.

With regard to Academia the least of respondents felt that they were very relevant. However, Academic/research institution, EU citizen and Public authority consider this element as relevant. Most of the respondents among different stakeholder groups did not indicate Foundations and NGOs as very relevant. No respondents from different stakeholder groups indicated that any of the categories was

'Not relevant at all'. No statistical differences were found between the views of citizens and other respondents.

***Figure 25: In your view, how relevant are the following elements and activities to ensure that the proposed European Partnership would meet its objectives - Responses for the Circular Bio-based Europe Initiative - Pooling and leveraging resources (financial, infrastructure, in-kind expertise, etc.) through coordination, alignment and integration with:***

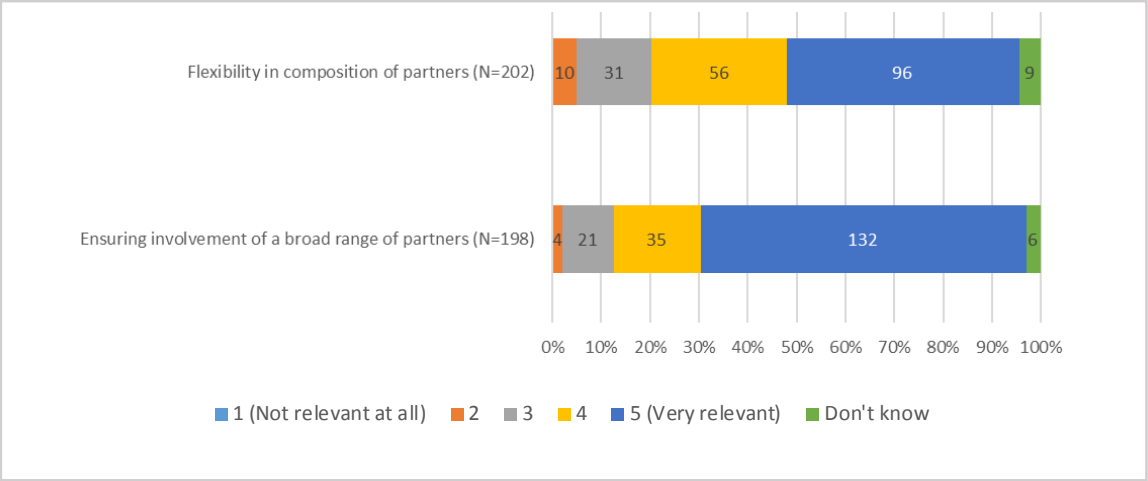



## Relevance of the partnership composition

Respondents were asked about the relevance of the Partnership composition, such as the flexibility in the composition of partners over time and the involvement of a broad range of partners (including across disciplines and sectors), to reach Partnership objectives. As is visible in Figure 26, ensuring involvement of a broad range of partners has more 'very relevant' answers (132, 66.67%) than the flexibility in the composition of partners (96, 47.52%). Overall 80% of respondents have given flexibility either a score of 4 or 5 (very relevant), while 84% have given the broad range of partners a score of 4 or 5 (very relevant).

No statistical differences were found between the views of citizens and other respondents.

***Figure 26: In your view, how relevant are the following elements and activities to ensure that the proposed European Partnership would meet its objectives - Responses for the Circular Bio-based Europe Initiative - Partnership composition***

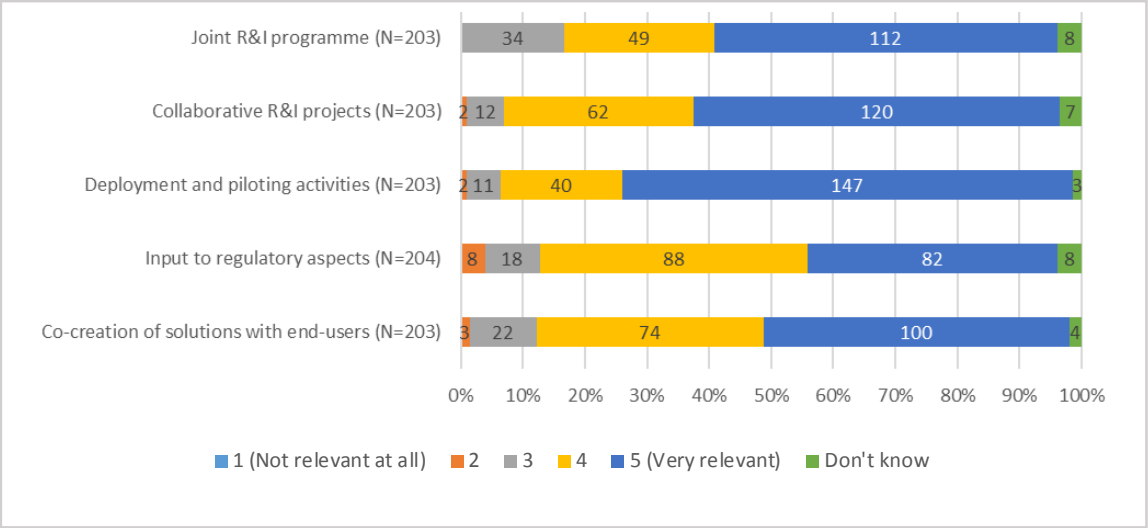



## Relevance of activities

Respondents were asked to provide opinions on the relevance of implementing a set of activities for meeting the objectives of the candidate Circular Bio-based Europe Partnership. Among activities were listed – a joint R&D programme, collaborative R&D projects, deployment and piloting activities, input to regulatory aspects and co-creation of solutions with end-users. Out of 203 respondents, 147 (72.41%) indicated that deployment and piloting activities are very relevant to ensure that the Partnership would meet its objectives. Collaborative R&I projects have also been considered as very relevant by a large number of respondents (120 respondents or 59.11%). In particular, a large majority of academics, business associations and EU citizens, and all respondents from public authorities, indicated collaborative R&I projects as relevant. In contrast, input to regulatory aspects is considered less relevant by respondents. However, still a large share of academics, business associations, businesses (250+), public authorities and other types of respondents indicated this element as relevant.

Respondents that are/were involved in a current/preceding partnership found joint R&I programmes more relevant than other respondents. Overall, this element was considered as relevant by more than half of business associations, business organisations and NGOs, and by more than two thirds of academics, EU citizens and public authorities.

***Figure 27: In your view, how relevant are the following elements and activities to ensure that the proposed European Partnership would meet its objectives - Responses for the Circular Bio-based Europe Initiative - Implementing the following activities***



### *1.3.6. Relevance of setting up a legal structure (funding body) for the candidate European Partnerships to achieve improvements*

Respondents were also asked to assess the relevance of a specific legal structure (funding body) for the candidate European Partnership to implement several activities. According to Figure 28 most respondents indicated that a specific legal structure was 'very relevant' to implement its activities more effectively. The majority of stakeholders from business associations, SMEs, businesses (250+), public authorities and EU citizens indicated a high relevance of a legal structure for a more effective implementation of activities.

Respondents that are/were involved in a current/preceding partnership found the effective implementation of activities, increased financial leverage and the collaboration with other partnerships more relevant than other respondents.

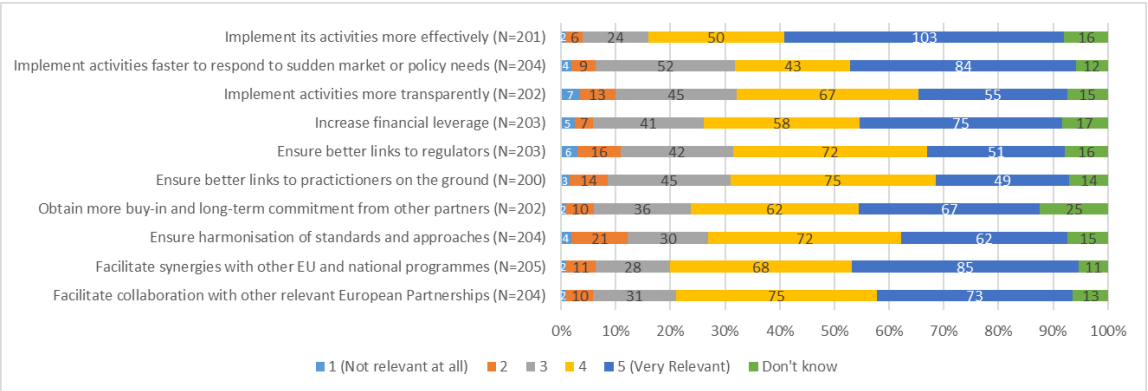
Overall, the majority of respondents in all stakeholder groups indicated the set-up of a legal structure as relevant or highly relevant to: implement activities more effectively and more transparently; increase financial leverage; ensure better links to practitioners on the ground; obtain more buy-in and long-term commitments from other partners; ensure harmonization of standards; and facilitate synergies with other EU and national programmes.

A legal structure was considered relevant or highly relevant for a faster implementation of activities to respond to sudden market or policy needs by the majority of respondents in all stakeholder groups, with the exception of business associations where more than half considered it relevant to a smaller degree.

Contrarily to all other stakeholder groups, a moderate majority of EU citizens considered a legal structure either close to not relevant or relevant to a smaller degree to ensure better links to regulators. Similarly, the majority of NGOs indicated a specific legal structure to be close to not relevant or relevant only to a small degree to facilitate collaboration with other relevant European Partnerships.

The number of respondents that have indicated that they view a measure as 'not relevant at all' is very small across all the measures and all stakeholder groups.

***Figure 28: In your view, how relevant is to set up a specific legal structure (funding body) for the candidate European Partnership to achieve the following? - Responses for the Circular Bio-based Europe Initiative***

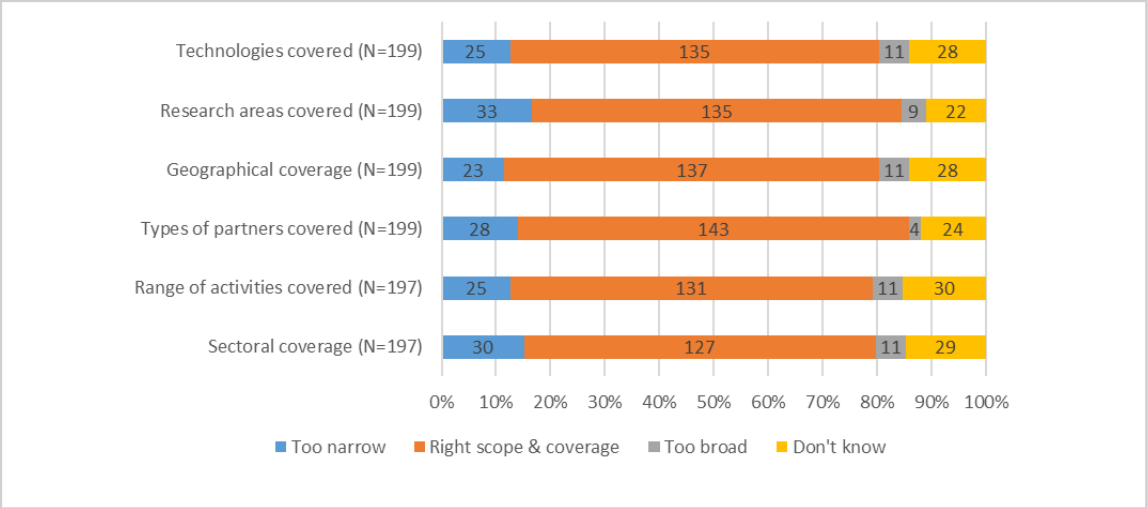


### *1.3.7. Scope and coverage of the candidate European Partnerships based on their inception impact assessments*

Respondents were asked to assess the scope and coverage of the Circular Bio-based Europe Partnership, based on its inception impact assessment. The clear majority of the respondents across all stakeholder groups have indicated that the partnership has the right scope and coverage across all areas, although geographical coverage and types of partners covered have the highest number of right scope and coverage answers. On average, a very small share of respondents have indicated that they felt the scope and coverage were too broad, while a slightly higher but still small share of respondents have indicated that the scope was too narrow. In particular, a higher share of NGOs compared to other stakeholders groups, have indicated this with regards to technologies covered. Similarly, a higher share of academics compared to other stakeholder groups, have indicated geographical coverage, research areas, range of activities and sectoral coverage to be too narrow, although the majority still considered these as correctly covered.

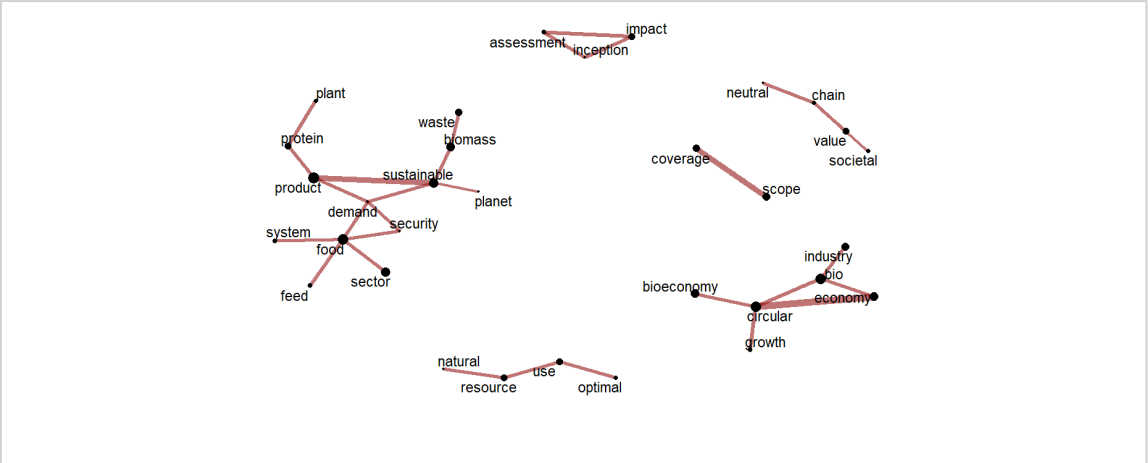
No statistical differences were found between the views of citizens and other respondents.

***Figure 29: What is your view on the scope and coverage proposed for this candidate institutionalised European Partnership, based on its inception impact assessment? Respondents for the candidate Circular Bio-based Europe Partnership***




Aside from this multiple-choice question, the respondents were also asked to provide any comment that they may have on the proposed scope and coverage for this candidate Institutionalised Partnership. The keyword analysis used for open questions resulted in the graph shown below. This analysis showed the respondents used this question to talk about sustainable biomass, plant protein, food security as well as the circular (bio)economy and an inception impact assessment.

***Figure 30: Assessment of open answers with regard to the proposed scope and coverage for this candidate Institutionalised Partnership, 30 most common co-occurring keywords (N=69)***




Two business respondents endorse the vision as it has been formulated by the BIC including food security & demand for sustainable products; sustainable planet; jobs and growth in the circular bioeconomy; and circular bioeconomic society. An EU citizen suggested additionally including the development of biomimetic materials for large-scale applications in the energy and construction sector. A representative of academia pointed out that the point of view of the citizens has to be considered. Another representative of academia emphasized that it is necessary to finance innovative technologies. A representative of a regional authority underlined that regional or bigger geographical coverage is needed in terms of volumes and market. A representative of a large company drew the attention to the significant potential coming from the Industrial Symbiosis.

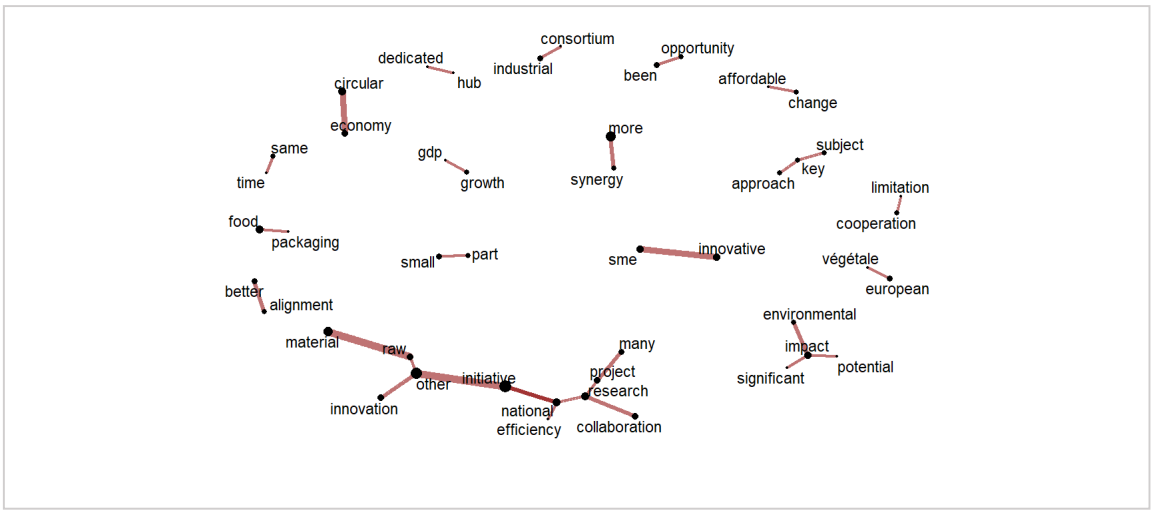
### *1.3.8. Scope for rationalisation and alignment of candidate European Partnerships with other initiatives*

The respondents were also asked if it they thought it would be possible to rationalise the candidate European Institutionalised Partnership and its activities, and/or to better link it with other comparable initiatives. 100 respondents (57.47%) have indicated that they think this is the case.

No statistical differences were found between the views of citizens and other respondents.

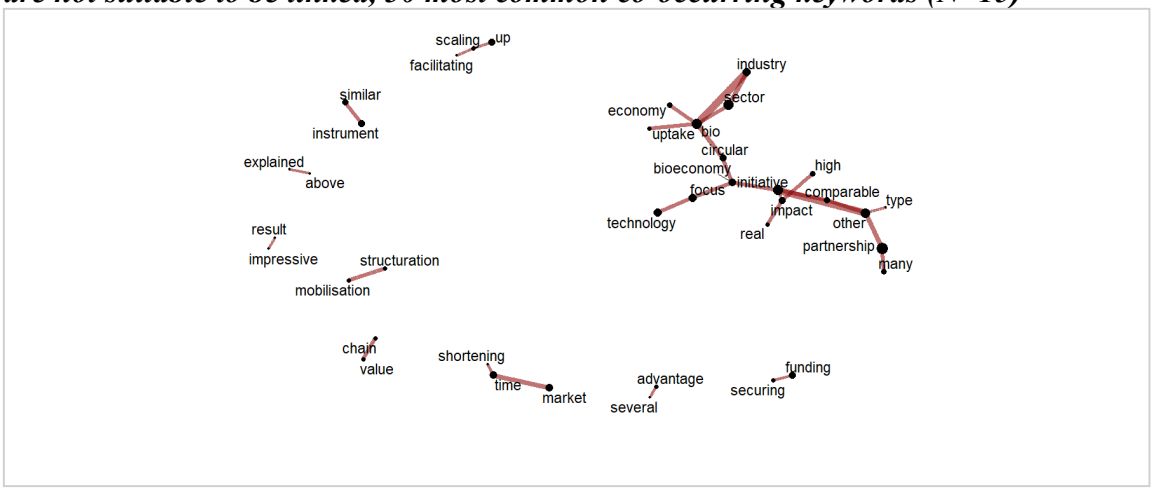
The respondents who answered affirmatively were asked to indicate which other comparable initiatives this proposed partnership could be linked with. The keyword analysis used for open questions resulted in the graph shown in Figure 31. This analysis showed the respondents used this question to talk about several initiatives with which it should actively cooperate and foster links, including Innovative SMEs (suggested by a large company); the HEU missions on "Soil health and food" and on " Healthy Oceans, Seas, Coastal and Inland Waters' (suggested by an academic); and European Platforms such as SUSCHEM on plastic circular economy and the materials platform EUMAT (suggested by an academic). Making these links would ensure the initiative reaches its potential of significant environmental impact.

***Figure 31: Assessment of open answers with regard to the proposed scope and coverage for this candidate Institutionalised Partnership, 30 most common co-occurring keywords (N=53)***




For the respondents who answered negatively on the previous question, the results of the analysis resulted in the chart shown in Figure 32 showing the co-occurrences of keywords. The results show that respondents are interested in the uptake of bioeconomy and circular initiatives by the industry and having real impact comparable to other types of partnerships. Respondents acknowledged that the candidate partnership is the only initiative at EU level that specifically addresses the challenges of the biotechnology sector. A medium company underlined that the Institutionalized Partnership is necessary to enable shorter development and scale-up technologies; to bring new bio-based products to the market; and further strengthen EU's position in the global bio-economy market. A medium company acknowledged that while the bioeconomy will take place in regions, it requires a very broad stakeholder network to identify the relevant technologies and bring them to higher TRLs.

***Figure 32: Assessment of open answers on the question why other comparable initiatives are not suitable to be linked, 30 most common co-occurring keywords (N=15)***




### *1.3.9. Relevance of European Partnerships to deliver targeted scientific, economic/technological and societal impacts*

Respondents were asked to assess the relevance of the candidate European Institutionalised Partnership to deliver on listed impacts. According to Figure 33, among societal impacts, a greater number of respondents suggest that the Partnership would be 'very relevant' for reducing greenhouse emissions, for maximisation of valorisation of organic waste, and agriculture and forestry residues, and for replacement of oil-based chemicals and materials with bio-based and biodegradable ones. In

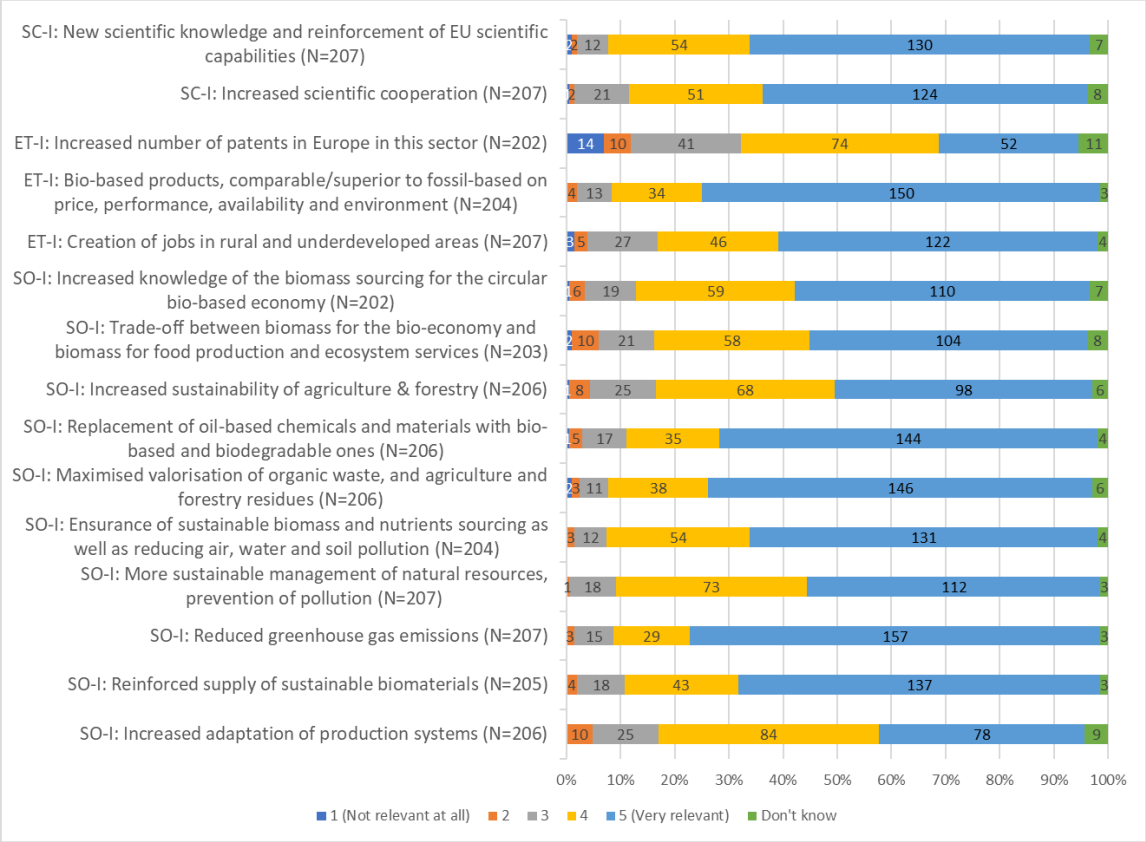
comparison, the least number of respondents considered that the partnership would be ‘very relevant’ for increasing adoption of production systems. Among economic/technological impact categories, a greater number of respondents (150 out of 204, or 73.53%) indicated that the Partnership would be ‘very relevant’ for delivery of bio-based products that are comparable and/or superior to fossil-based products. The pattern of responses on impacts in the area of science are very similar – over 60% of respondents believe that the Partnership would be ‘very relevant’ for generating new scientific knowledge and for increasing scientific cooperation.

The majority of respondents across all stakeholder groups considered European Partnerships to be either very relevant or relevant to deliver the targeted scientific, social and economic impacts. Citizens found the societal impact related to sustainable management of natural resources and the economic/technological impact related to the creation of jobs in rural and underdeveloped areas more relevant.

A greater share of businesses (250+), SMEs, public authorities and NGOs, compared to other stakeholder groups - although still not the majority - considered European Partnerships to be either not relevant or relevant to a smaller degree to deliver targeted social impacts.

An even higher share of the abovementioned stakeholder groups - although not the majority - considered European Partnerships to be either not relevant or relevant to a smaller degree to deliver targeted economic impacts.

***Figure 33: In your view, how relevant is it for the candidate European Institutionalised Partnership to deliver on the following impacts? Responses for the candidate Circular Bio-based Europe Partnership***




### *1.3.10. Summary of campaigns results for this specific initiative*

One campaign has been identified among respondents that decided to provide views on the candidate Partnership on Circular Biobased Europe. This campaign consists of 20 respondents (campaign #5).

***Table 6: Overview of responses of the first campaign (campaign #5) (N=20)***

| Question category | Summary of responses |
|---|---|
| Research and innovation problems | The answer category "lack of understanding of the circular and bio-based economy" was assessed 'very relevant' by all respondents. The other categories received a score of 4, on average. |
| Structural and resource problems | With exception of two respondents, all respondents gave a high score (5 'very relevant') for a category "limited collaboration and pooling of resources between public actors and private actors etc.". The other category received a lower score (between 3 and 4). |
| Problems in uptake of digital innovations | Most respondents considered that the following categories are 'very relevant': "lack of competitiveness with the traditional products/materials", "lack of private investment", "lack of public investment". Other answer categories received a lower score, on average. |
| Preferred Horizon Europe intervention | Institutionalised Partnership option was selected by most respondents. Only one respondent indicated that the challenges can be better addressed via "co-funded |

| Question category | Summary of responses |
|---|---|
| | partnership".<br><br>When respondents were asked to explain their choice, almost all of them used the following quote: *"Challenges mentioned above require joint investments, setting up new value chains and creating synergies. An iPPP addresses the multi-actor nature of the bio-based industries and enables long-term collaboration of different sectors (industry, academia, society, member states, regions) to solve these challenges and to create a favourable climate for investment in the bio-based sector in Europe".* |
| Relevance of actors for setting join long-term agenda | Almost all respondents consider that involvement of industry is 'very relevant'. The involvement of "Member States and Associated Countries" is considered 'relevant' (score 4) by most respondents. Other categories received a slightly lower score, on average. |
| Relevance of actors for pooling and leveraging resources | Almost all respondents consider that involvement of industry is 'very relevant'. The involvement of "Member States and Associated Countries" is considered 'relevant' (score 4) by most respondents. Other categories received a slightly lower score, on average. |
| Partnership composition | Most respondents suggest that "involvement of a broad range of partners, etc." is 'very relevant'. The second answer category received a lower score, on average. |
| Implementation of activities | Across all respondents consider that "deployment and piloting activities" are 'very relevant'. Other answer categories were given a score of 4 'relevant', on average. |
| Relevance of the legal structure | With exception of one respondent, all respondents consider that the legal structure would be 'very relevant' for implementing Partnership activities more effectively. Other answer categories received an average score of 4 'relevant'. The lowest score (namely, 3) was given to the category "implement activities faster to respond to sudden market or policy needs". |
| Scope and coverage of the candidate Partnership | Across all answer categories, most respondents consider that the elements are of right scope and coverage.<br><br>Respondents were offered an opportunity to provide comments on the proposed scope and coverage of the Institutionalised Partnership. Most of them included the following quote:<br><br>*"Scope (cf. 2050 vision signed by BIC & 14 associations):*<br><br>*1. Food security and demand for sustainable products (integrated, efficient production of food, feed, bio-based products, services, energy with minimal environmental impact)*<br><br>*2. A sustainable planet (carbon-neutral value chains, optimal use of natural resources, protect environment, add societal value)*<br><br>*3. Jobs & growth in the circular bioeconomy (mobilise local feedstock)*<br><br>*4. Circular bioeconomic society (participating citizens)."* |
| Rationalisation of the candidate Partnership and linking to other initiatives | 90% of respondents (18 out of 20) consider that it would not be possible to rationalise the candidate Partnership and its activities, and/or to better link it with other comparable initiatives.<br><br>Respondents were asked to explain their answer, most of them inserted a following quote: *"There is no similar instrument to address the challenges for the bio-based sector in the EU like an iPPP: it covers a funding gap, enables scaling up and shorter time to market through focus on higher TRL (5-8), provides grants (vis a vis loans and which don't have the same effect), bio-based industry sector is still very fragmented* |

| Question category | Summary of responses |
|---|---|
| | *between actors and across geographies, essential to continue on-going structuration."* |
| Societal impact | Almost all respondents consider that the Partnership would be 'very relevant' to deliver on most categories of results. The exceptions include: "increased adaptation of production systems", "more sustainable management of natural resources, prevention of pollution", "increased sustainability of agriculture & forestry" and "increased knowledge of the biomass sourcing for the circular bio-based economy". In those categories, the average score is 4 'relevant'. |
| Economic/technological impact | For the categories "creation of jobs in rural and underdeveloped areas" and "increased number of patents in Europe in this sector", majority of respondents indicated that impacts are 'very relevant'. The remaining answer category received a score of 4, on average. |
| Scientific impact | Across all listed categories, majority of respondents indicated that impacts are 'very relevant'. |

# Annex 3 Who Is Affected And How?

## 1. PRACTICAL IMPLICATIONS OF THE INITIATIVE

- The proposed institutionalised partnership enables participation of all key stakeholders potentially contributing to the specifications and delivery of the strategic R&I agenda through a clearly defined membership structure. The stakeholders concerned are specified in the table below.

- It provides a forum for co-drafting R&I priorities and the work programmes, ensuring that they are aligned with industry and market needs.

- Participation is less flexible than under other options, but it is nevertheless possible to change the profile of participation over time, with new partners joining to support new areas of activity in response to emerging results and changing priorities.

### SUMMARY OF COSTS AND BENEFITS

| *I. Overview of Benefits (total for all provisions) – Preferred Option* | | |
|---|---|---|
| ***Description*** | ***Estimation (quantitative or qualitative)*** | ***Comments*** |
| ***Direct benefits*** | | |
| A more competitive primary sector producing biomass | | Higher and secure income for primary producers (also in less-favoured regions); secured supply for bio-based industries; economic growth for SMEs. |
| Cost savings for municipalities and regions regarding waste disposal | | Part of the biowaste sold to the bio-based industry as raw material |
| A more competitive bio-based industry sector | | Secured biomass supply for bio-based industries; economic growth for SMEs. |
| Access to more sustainable products by brand-owners and consumers | | Continuously increasing demand satisfied |
| ***Indirect benefits*** | | |
| Reduction of $CO_2$ emissions due the switch from fossil- to bio-based | | A larger proportion of chemicals and materials including plastics produced from biomass and biowaste. |

| | | |
|---|---|---|
| Biodiversity conservation or enhancement | | As a result of lower toxicity bio-based products developed and as a result of sustainable management of natural resources, especially biodiversity-friendly biomass generation. |

*(1) Estimates are relative to the baseline for the preferred option as a whole (i.e. the impact of individual actions/obligations of the preferred option are aggregated together); (2) Please indicate which stakeholder group is the main recipient of the benefit in the comment section;(3) For reductions in regulatory costs, please describe details as to how the saving arises (e.g. reductions in compliance costs, administrative costs, regulatory charges, enforcement costs, etc.; see section 6 of the attached guidance).*

| ***II. Overview of direct and indirect costs – Preferred option*** | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Citizens/Consumers | | Businesses ([8]) | | Administrations ([9]) | |
| | | One-off | Recurrent | One-off | Recurrent | One-off | Recurrent |
| **Management/ Administrative costs** | Direct costs | | | | € 1 m per year over 10 years ([10]) | | € 1 m per year over 10 years ([10]) |
| | Indirect costs | | | | | | |
| **Personnel costs** | Direct costs | | | | € 1.25 m per year over 10 years (for 25 FTE) ([11])<br><br>€ 0.4 m per year over 11 years for 4 FTE ([12]) | | € 1.25 m per year over 10 years (for 25 FTE) ([11]) |
| | Indirect costs | | | | | | € 0.5 m per year over 11 years for 5 FTE at operational and coordi-nating Com-mission |

[8] Sum of below: 10+12.5+4.4 = EUR 26.9 m.

[9] Sum of below: 10+12.5+5.5 = EUR 28 m.

[10] Other expenses and finance costs of the BBI JU programme office were EUR 2.1 m in 2018 (Accounts 2018, p.8), to be paid 50:50 by the EC and the private partner.

[11] BBI JU programme office staff cost with 20 staff was EUR 2 m in 2018 (Accounts 2018, p. 8). Extrapolation to 25 staff in CBE. To be paid 50:50 by the EC and the private partner.

[12] The private partner's secretariat. Estimation.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | units |
| **Coordination costs (or transaction costs)** | | | | | | | |
| **Budget expenditure/ investment costs** | | | | € 1,000 to 3,000 m over the whole period ([13]) | | € 1,000 m over the whole period ([14]) | |

*(1) Estimates to be provided with respect to the baseline; (2) costs are provided for each identifiable action/obligation of the preferred option otherwise for all retained options when no preferred option is specified; (3) If relevant and available, please present information on costs according to the standard typology of costs (compliance costs, regulatory charges, hassle costs, administrative costs, enforcement costs, indirect costs; see section 6 of the attached guidance).*

[13] 100-300% private contribution (also pending MFF decision and breakdown of the budget). No contribution commitment from private partner yet.

[14] Pending MFF decision and breakdown of the budget.

# Annex 4 Analytical Methods

The methodology for each impact assessment is based on the Commission Better Regulation Guidelines[15] to evaluate and compare options with regards to their **efficiency, effectiveness and coherence**. This is complemented by integrating the **conditions and selection criteria for European Partnerships**, as well as requirements for setting up Institutionalised Partnerships.[16]

## 1. OVERVIEW OF THE METHODOLOGIES EMPLOYED

In terms of **methods and evidence used**, the set of impact assessments for all candidate Institutionalised European Partnerships draw on an external study covering all initiatives in parallel to ensure a high level of coherence and comparability of analysis. [17] (.

All impact assessments mobilised a mix of qualitative and quantitative data collection and analysis methods. These methods range from desk research and interviews to the analysis of the responses to the Open Consultation, stakeholder analysis and composition/portfolio analysis, bibliometrics/patent analysis and social network analysis, and a cost-effectiveness analysis.

The first step in the impact assessment studies consisted in the definition of the context and the problems that the candidate partnerships are expected to solve in the medium term or long run. The main data source in this respect was desk research. This includes grey and academic literature to identify the main challenges in the scientific and technologic fields and in the economic sectors relevant for the candidate partnerships, as well as the review of official documentations on the policy context for each initiative.

In the assessment of the problems to address, the lessons to be learned from past and ongoing partnerships were taken into account, especially from relevant midterm or ex-post evaluations.

The description of the context of the candidate institutionalised European Partnerships required a good understanding of the corresponding research and innovation systems and their outputs already measured. Data on past and ongoing Horizon 2020 projects, including the ones implemented through Partnerships, served as basis for descriptive statistic of the numbers of projects and their respective levels of funding, the type of organisations participating (e.g. universities, RTOs, large enterprises, SMEs, public administrations, NGOs, etc.) and how the funding was distributed across them. Special attention was given to analysing the participating countries (and groups of countries, such as EU, Associated Countries, EU13 or EU15) and industrial sectors, where relevant. The sectoral analysis required enriching the eCORDA data received from the European Commission services with sector information extracted from ORBIS, using the NACE codification up to level 2. These

[15] European Commission (2017), Better Regulation Guidelines (SWD (2017) 350)

[16] A pivotal element of the present analysis is the so-called two-step 'necessity test' for European Partnerships, used to establish: step 1) the need for a partnership approach in the first place, followed by step 2) a justification for the form of Institutionalised Partnership. The necessity test is described in Annex 6. This impact assessment focuses on the second step of the test.

[17] Technopolis Group (2020), Impact Assessment Study for Institutionalised European Partnerships under Horizon Europe

data enabled the identification of the main and, where possible, emerging actors in the relevant systems, i.e. the organisations, countries and sectors that would need to be involved (further) in a new initiative.

A Social Network Analysis was performed by the contractors using the same data. It consisted in mapping the collaboration between the participants in the projects funded under the ongoing R&I partnerships. This analysis revealed which actors – broken down per type of stakeholders or per industrial sector – collaborate the most often together, and those that are therefore the most central to the relevant research and innovation systems.

The data provided finally served a bibliometric analysis run by the contractor aimed at measuring the outputs (patents and scientific publications) of the currently EU-funded research and innovation projects. A complementary analysis of the Scopus data enabled to determine the position and excellence of the European Union on the international scene, and identify who its main competitors are, and whether the European research and innovation is leading, following or lagging behind.

A cost modelling exercise was performed in order to feed into the efficiency assessments of the partnership options.

The conclusions drawn from the data analysis were confronted to the views of experts and stakeholders collected via three means:

- The comments to the inception impact assessments of the individual candidate institutionalised European Partnerships;
- The open public consultation organised by the European Commission from September to November 2019;
- The interviews (up to 50) conducted by each impact assessment study team conducted between August 2019 and January 2020 (policymakers, business including SMEs and business associations, research institutes and universities, and civil organisations, among others).

The views of stakeholders (and experts) were particularly important for determining the basic functionalities (see further below) that the future partnerships need to demonstrate to achieve their objectives as well as their most anticipated scientific, economic and technological, and societal impacts. The interviews allowed more flexibility to ask the respondents to reflect about the different types of European Partnerships. Furthermore, as a method for targeted consultation, it was used to get insights from the actors that both the Study Teams and the European Commission were deemed the most relevant. For the comparative assessment of impacts, the external contractors confronted the outcomes of the different stakeholder consultation exercises to each other with a view of increasing the validity of their conclusions, in line with the principles of triangulation.

Annex 2 includes also the main outcomes of the stakeholder consultation exercises.

## 2. METHOD FOR ASSESSING THE EFFECTIVENESS, EFFICIENCY AND COHERENCE OF EACH OPTION - THE USE OF FUNCTIONALITIES

Given the focus of the impact assessment on comparing different forms of implementation, the Better Regulation framework has been adapted to introduce "**functionalities**". These are used to reflect *what is needed in terms of implementation* for each candidate initiative to be able to deliver on its objectives. The functionalities are the **distinguishing factors** between the different options and are directly linked to the European Partnerships' selection criteria of openness and transparency, additionality and directionality (see Annex 6). Based on the objectives identified and the targeted impact, functionalities describe what this requires in terms of implementation. Each form of implementation is then assessed to establish to which degree it would allow for these functionalities to be covered, e.g. the type and composition of actors that can be involved ('openness'), the range of activities that can be performed (including additionality and level of integration), the level of directionality and integration of stakeholders' R&I strategies[18]; the possibilities offered for coherence and synergies with other components of Horizon Europe, including other Partnerships (internal coherence), and the coherence with other EU, national or regional policy environments, including with the relevant regulatory and standardisation framework (external coherence). This approach guides the identification of discarded options and allows a structured comparison of the options against the selection criteria for European Partnerships.

*Figure 3 Overview of key functionalities of each form of implementation of European Partnerships*

| **Baseline: Horizon Europe calls** | **Option 1: Co-programmed** | **Option 2: Co-funded** | **Option 3.1: Institutionalised Article 185** | **Option 3.2: Institutionalised Article 187** |
|---|---|---|---|---|
| **Type and composition of actors (including openness and roles)** | | | | |
| Partners: N.A., no common set of actors that engage in planning and implementation<br>Priority setting: open to all, part of Horizon Europe Strategic planning<br>Participation in R&I activities: fully open in line with standard Horizon Europe rules | Partners: Suitable for all types: private and/or public partners, foundations<br>Priority setting: Driven by partners, open stakeholder consultation, MS in comitology<br>Participation in R&I activities: fully open in line with standard Horizon Europe rules | Partners: core of national funding bodies or govern-mental research organisations<br>Priority setting: Driven by partners, open stakeholder consultation<br>Participation in R&I activities: limited, according to national rules of partner countries | Partners: National funding bodies or governmental research organisation<br>Priority setting: Driven by partners, open stakeholder consultation<br>Participation in R&I activities: fully open in line with standard Horizon Europe rules, but possible derogations | Partners: Suitable for all types: private and/or public partners, foundations<br>Priority setting: Driven by partners, open stakeholder consultation<br>Participation in R&I activities: fully open in line with standard Horizon Europe rules, but possible derogations |
| **Type and range of activities (including additionality and level of integration)** | | | | |
| Activities: Horizon Europe standards that allow broad range of individual | Activities: Horizon Europe standard actions that allow broad range of individual actions, | Activities: Broad, according to rules/programmes of participating States, State-aid | Activities: Horizon Europe standards that allow broad range of individual actions, support to regulatory | Activities: Horizon Europe standards that allow broad range of individual actions, support to |

[18] The criterion on the ex-ante demonstration of partners' long term commitment depends on a series of factors that are unknown at this stage, and thus fall outside the scope of the analysis.

| Baseline: Horizon Europe calls | Option 1: Co-programmed | Option 2: Co-funded | Option 3.1: Institutionalised Article 185 | Option 3.2: Institutionalised Article 187 |
|---|---|---|---|---|
| actions<br>Additionality: no additional activities and investments outside the funded projects<br>Limitations: No systemic approach beyond individual actions | support to market, regulatory or policy/ societal uptake<br>Additionality: Activities/investments of partners, National funding<br>Limitations: Limited systemic approach beyond individual actions. | rules, support to regulatory or policy/ societal uptake<br>Additionality: National funding<br>Limitations: Scale and scope depend on the participating programmes, often smaller in scale | or policy/societal uptake, possibility to systemic approach<br>Additionality: National funding | regulatory or policy/societal uptake, possibility to systemic approach (portfolios of projects, scaling up of results, synergies with other funds.<br>Additionality: Activities/investments of partners/ national funding |
| **Directionality** | | | | |
| Priority setting: Strategic Plan and annual work programmes, covering max. 4 years.<br>Limitations: Fully taking into account existing or to be developed SRIA/ roadmap | Priority setting: Strategic R&I agenda/ roadmap agreed between partners and COM, covering usually 7 years, including allocation of Union contribution<br>Input to FP annual work programme drafted by partners, finalised by COM (comitology)<br>Objectives and commitments are set in the contractual arrangement. | Priority setting: Strategic R&I agenda/ roadmap agreed between partners and COM, covering usually 7 years, including allocation of Union contribution<br>Annual work programme drafted by partners, approved by COM<br>Objectives and commitments are set in the Grant Agreement. | Priority setting: Strategic R&I agenda/ roadmap agreed between partners and COM, covering usually 7 years, including allocation of Union contribution<br>Annual work programme drafted by partners, approved by COM<br>Objectives and commitments are set in the legal base. | Priority setting: Strategic R&I agenda/ roadmap agreed between partners and COM, covering usually 7 years, including allocation of Union contribution<br>Annual work programme drafted by partners, approved by COM (veto-right in governance)<br>Objectives and commitments are set in the legal base. |
| **Coherence: internal (Horizon Europe) and external (other Union programmes, national programmes, industrial strategies)** | | | | |
| Internal: Between different parts of the Annual Work programme can be ensured by COM<br>External: Limited for other Union programmes, no synergies with national/regional programmes and activities | Internal: Coherence among partnerships and with different parts of the Annual Work programme of the FP can be ensured by partners and COM<br>External: Limited synergies with other Union programmes and industrial strategies<br>If MS participate, with national/ regional programmes and activities | Internal: Coherence among partnerships and with different parts of the Annual Work programme of the FP can be ensured by partners and COM<br>External: Synergies with national/ regional programmes and activities | Internal: Coherence among partnerships and with different parts of the Annual Work programme of the FP can be ensured by partners and COM<br>External: Synergies with national/ regional programmes and activities | Internal: Coherence among partnerships and with different parts of the Annual Work programme of the FP can be ensured by partners and COM<br>External: Synergies with other Union programmes and industrial strategies<br>If MS participate, with national/ regional programmes and activities |

On the basis of the evidence collected, the thematic impact assessments evaluate the **effectiveness** of the various policy options along three dimensions corresponding to the

different categories of likely impacts: scientific, economic and technological, and societal (including environmental). Each impact assessment considers to which extent the different policy options fulfil the desirable 'functionalities' and are therefore likely to produce the targeted impacts. In addition, where specific impacts (e.g. on fundamental rights) are relevant for a candidate Partnership, these are assessed in the corresponding report and according to the Better Regulation Guidelines and Toolbox. This analysis results in a scoring of the policy options with a three-point scale. Scores vary from + to +++, where + refers to low potential for reaching the likely impacts, ++ to a good potential, and +++ to a high potential. The effectiveness assessment of the different options does not use a compound score but concludes on as many scores as there are expected impacts. This is done to increase transparency and accuracy in the assessment of options. Qualitative and quantitative evidence is provided to motivate each score.

A similar approach is followed to evaluate the coherence of options with the overarching objectives of the EU's R&I policy, and distinguishes between **internal** and **external coherence**. Specifically, internal coherence corresponds to the consistency between a given implementation mode and the other actions under Horizon Europe. External coherence refers instead to the alignment with other initiatives at EU, national and international level beyond Horizon Europe that are relevant to a thematic area. Each option (implementation mode) is assessed following a three-point qualitative scale.

To compare the expected costs and benefits of each option (**efficiency**), the thematic impact assessments broadly follow a cost-effectiveness approach[19] to establish to which extent the intended objectives can be achieved for a given cost. A preliminary step in this process is to obtain a measure of the expected costs of the policy options, to be used in the thematic assessments. As the options correspond to different implementation modes, relevant cost categories generally include the costs of setting-up and running an initiative. For instance, set-up costs includes items such as the preparation of a European Partnership proposal and the preparation of an implementation structure. The running costs include the annual work programme preparation costs. Where a Partnership already exists, discontinuation costs and cost-savings are also taken into account[20]. The table below provides an overview of the cost categories used in the impact assessment and a qualitative scoring of their intensity when compared to the baseline option (traditional calls). Providing a monetised value for these average static costs would have been misleading, because of the different features and needs of each candidate initiative.[21] The table shows the overall administrative, operational and coordination costs of the various options. These costs are then put into context in the impact assessments to reflect the expected co-financing rates and the total budget available for each of the policy options, assuming a common Union contribution (cost-efficiency):

- The costs related to the baseline scenario (traditional calls under Horizon Europe) are pre-dominantly the costs of implementing the respective Union contribution via calls and project, managed by the executive agencies (around 4%, efficiency of 96% for the

[19] For further details, see Better Regulation Toolbox # 57.

[20] Discontinuation costs will bear winding down and social discontinuation costs and vary depending on e.g. the number of full-time-equivalent (FTEs) staff concerned, the type of contract (staff category and duration) and applicable rules on termination (e.g. contracts under Belgian law or other). If buildings are being rented, the cost of rental termination also apply. As rental contracts are normally tied to the expected duration of the current initiatives, these termination costs are likely to be very limited. In parallel, there would also be financial cost-savings related to the closing of the structure, related to operations, staff and coordination costs in particular. This is developed further in the individual efficiency assessments.

[21] A complete presentation of the methodology developed to assess costs as well as the sources used is described in the external study supporting this impact assessment (Technopolis Group, 2020).

overall investment).

- For a Co-Programmed partnership the costs of preparation and implementation increase only marginally compared to the baseline (<1%),[22] but lead to an additional R&I investment of at least the same amount than the Union contribution[23] (efficiency of 98% for the overall investment).
- For a Co-Funded partnership the additional R&I investment by Member States accounts for 2,3 times the Union contribution[24]. The additional costs compared to the baseline of preparing and implementing the partnership, including the management of the Union contribution implemented by the national programmes, can be estimated at 6% of the Union contribution (efficiency of 98% related to the overall investment).[25]
- For an Article 185 initiative the additional R&I investment by Member States is equal to the Union contribution[26]. The additional costs compared to the baseline of preparing and implementing the partnership, including the management of the Union contribution implemented by the dedicated implementation structure, can be estimated at 7% of the Union contribution (efficiency of 96% related to the overall investment).
- For an Article 187 initiative the additional R&I investment by partners is equal to the Union contribution[27]. The additional costs compared to the baseline of preparing and implementing the partnership, including the management of the Union contribution implemented by the dedicated implementation structure, can be estimated at 9% of the Union contribution (efficiency of 94% related to the overall investment).

*Figure 4 - Intensity of additional costs compared with Horizon Europe Calls (for Partners, stakeholders, public and EU)*

| Cost items | Baseline: traditional calls | Option 1: Co-programmed | Option 2 Co-funded | Option 3a - Art. 185 | Option 3b -Art. 187 |
|---|---|---|---|---|---|
| **Preparation and set-up costs** | | | | | |
| Preparation of a partnership proposal (partners and EC) | 0 | ↑↑ | | | |
| Set-up of a dedicated implementation structure | 0 | | | Existing: ↑<br>New: ↑↑ | Existing: ↑↑<br>New: ↑↑↑ |
| Preparation of the SRIA / roadmap | 0 | ↑↑ | | | |
| Ex-ante Impact Assessment for partnership | 0 | | | ↑↑↑ | |
| Preparation of EC proposal and negotiation | 0 | | | ↑↑↑ | |
| **Running costs (Annual cycle of implementation)** | | | | | |
| Annual Work Programme preparation | 0 | ↑ | | | |

[22] Specifically, some additional set-up costs linked for example to the creation of a strategic research and innovation agenda (SRIA) and additional running costs linked with the partners role in the creation of the annual work programmes and the Commission's additional supervisory responsibilities. A CPP will have lower overall costs than each of the other types of European Partnership, as it will function with a smaller governance and implementation structure than will be required for a Co-Funded Partnership or an Institutionalised Partnership and – related to this – its calls will be operated through the existing HEU agencies and RDI infrastructure and systems.

[23] Minimum contributions from partners equal to the Union contribution.

[24] Based on the default funding rate for programme co-fund actions of 30%, partners contribute with 70% of the total investment.

[25] These costs reflect set-up costs and additional running costs for partners, and the Commission, of the distributed, multi-agency implementation model.

[26] Based on the minimum requirement in the legal basis that partners contribute at least 50% of the budget.

[27] Based on the minimum requirement in the legal basis that partners contribute at least 50% of the budget.

| Cost items | Baseline: traditional calls | Option 1: Co-programmed | Option 2 Co-funded | Option 3a - Art. 185 | Option 3b -Art. 187 |
|---|---|---|---|---|---|
| Call and project implementation | 0 | 0<br>In case of MS contributions: ↑ | ↑ | ↑ | ↑ |
| Cost to applicants | Comparable, unless there are strong arguments of major differences in oversubscription | | | | |
| Partners costs not covered by the above | 0 | ↑ | 0 | ↑ | ↑ |
| Additional EC costs (e.g. supervision) | 0 | ↑ | ↑ | ↑ | ↑↑ |
| **Winding down costs** | | | | | |
| EC | 0 | | | | ↑↑↑ |
| Partners | 0 | ↑ | 0 | ↑ | ↑ |

Notes: 0: no additional costs, as compared with the baseline; ↑: minor additional costs, as compared with the baseline; ↑↑: medium additional costs, as compared with the baseline; ↑↑↑: higher costs, as compared with the baseline.

The cost categories estimated for the common model are then used to develop a scorecard analysis and further refine the assessment of options for each of the 12 candidate Institutionalised Partnerships. Specifically, the scores related to the set-up and implementation costs are used in the thematic impact assessments to consider the scale of the expected benefits and thereby allow a simple "value for money" analysis (**cost-effectiveness**). In carrying out the scoring of options, the results of fieldwork, desk research and stakeholder consultation undertaken and taken into account.

## 3. METHOD FOR IDENTIFYING THE PREFERRED OPTION – THE SCORECARD ANALYSIS

For the **identification of the preferred option,** the scorecard analysis builds a hierarchy of the options by individual criterion and overall in order to identify a single preferred policy option or in case of an inconclusive comparison of options, a number of 'retained' options or hybrid. This exercise supports the systematic appraisal of alternative options across multiple types of monetary, non-monetary and qualitative dimensions. It also allows for easy visualisation of the pros and cons of each option. Each option is attributed a value of 1 to 3, scoring the adjudged performance against each criterion with the three broad appraisal dimensions of effectiveness, efficiency and coherence.[28] The scorecard analysis was used to highlight those options that stand out as not being dominated by any of the other options in the group: such options are then retained as the preferential ones in the remainder of the analysis. It also allowed for easy visualisation of the pros and cons of alternative options.

Specifically, the scores related to the set-up and implementation costs are used in the thematic impact assessments to consider the scale of the expected benefits and thereby allow a simple "value for money" analysis (cost-effectiveness). In carrying out the scoring of options, the results of fieldwork, desk research and stakeholder consultation undertaken and taken into account.

These costs essentially refer to the administrative, operational and coordination costs of the various options. The figure shows how the scoring of costs range from a value of 0, in case an option does not entail any additional costs compared to the baseline (traditional calls), to a score of (-) for options introducing limited additional costs relative to the baseline and a score

[28] In the thematic impact assessments, scores are justified in a detailed manner to avoid arbitrariness and spurious accuracy. A qualitative or even quantitative explanation is provided of why certain scores were given to specific impacts, and why one option scores better or worse than others.

of (- -) when substantial additional costs are expected in comparison with the baseline. Should the costs of a policy option be lower than those of the baseline, (+) and (+ +) are used.

It is considered that while there is a clear gradation in the overall costs of the policy options, the cost differentials are less marked when one takes into account the expected co-financing rates and the total budget available for each of the policy options, assuming a common Union contribution. From this perspective, there are only one or two percentage points that split the most cost-efficient policy options – the baseline (traditional calls) and the Co-Programmed policy options – and the least cost-efficient – the Institutionalised Partnership option. A score of + is therefore assigned for cost-efficiency to the Co-Programmed and Co-Funded options, a score of 0 to the Article 185 option and a score of (-) for the Article 187 Institutionalised Partnership policy option.

*Figure 5 Scoring of costs*

| | **Baseline: Horizon Europe calls** | **Option 1: Co-programmed** | **Option 2: Co-funded** | **Option 3a: Institutionalised 185** | **Option 3b: Institutionalised 187** |
|---|---|---|---|---|---|
| **Administrative, operational and coordination costs** | 0 | (0) | ( - ) | ( - -) | (- -) |
| **Administrative, operational and coordination costs adjusted per expected co-funding (i.e. *cost-efficiency*)** | 0 | (+) | (+) | (0) | (-) |

Notes: Score 0 = same costs as for the baseline; score (-) = limited additional costs compared with the baseline; score (-)(-) = substantial additional costs compared with the baseline.

# Annex 5 Subsidiarity Grid

| **1. Can the Union act? What is the legal basis and competence of the Unions' intended action?** |
|---|
| **1.1 Which article(s) of the Treaty are used to support the legislative proposal or policy initiative?** |
| This proposal is based on (1) Article 185 TFEU which stipulates that in implementing the multiannual framework programme, the Union may make provision, in agreement with the Member States concerned, for participation in research and development programmes undertaken by several Member States, including participation in the structures created for the execution of those programmes; and (2) Article 187 TFEU according to which the Union may set up joint undertakings or any other structure necessary for the efficient execution of Union research, technological development and demonstration programmes (both Articles are under Title XIX of the TFEU - Research and Technological Development and Space).<br><br>The proposal aims to implement Article 8 of the Commission proposal for Horizon Europe - the future EU research and innovation (R&I) programme for 2021-2027, according to which, "*European Partnerships shall be established for addressing European or global challenges only in cases where they will more effectively achieve objectives of Horizon Europe than the Union alone and when compared to other forms of support of the Framework programme*". The Horizon Europe proposal has received the political agreement of the Council and the European Parliament. |
| **1.2 Is the Union competence represented by this Treaty article exclusive, shared or supporting in nature?** |
| Research is a shared competence between the EU and its Member States according to the TFEU. Article 4 (3) specifies that in the areas of research, technological development and space, the European Union can carry out specific activities, including defining and implementing programmes, without prejudice to the Member States' freedom to act in the same areas. |
| *Subsidiarity does not apply for policy areas where the Union has* ***exclusive*** *competence as defined in Article 3 TFEU[29]. It is the specific legal basis which determines whether the proposal falls under the subsidiarity control mechanism. Article 4 TFEU[30] sets out the areas where competence is shared between the Union and the Member States. Article 6 TFEU[31] sets out the areas for which the Unions has competence only to support the actions of the Member States.* |

[29] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:12008E003&from=EN
[30] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:12008E004&from=EN
[31] https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:12008E006:EN:HTML

## 2. Subsidiarity Principle: Why should the EU act?

**2.1 Does the proposal fulfil the procedural requirements of Protocol No. 2[32]:**

- Has there been a wide consultation before proposing the act?
- Is there a detailed statement with qualitative and, where possible, quantitative indicators allowing an appraisal of whether the action can best be achieved at Union level?

This proposal and the accompanying impact assessment were supported by a wide consultation of stakeholders, both during the preparation of the Horizon Europe proposal and - later on, all the candidates for European Partnerships. Member States were consulted via the Shadow Strategic configuration of the Horizon Europe Programme Committee. On candidates for institutionalised Partnerships based on Article 185/187 of the TFEU, an Open Public Consultation (OPC) was held between 11 September and 6 November 2019. Over 1 600 replies were received. In addition, targeted consultation activities were undertaken to prepare the present impact assessment. In particular, for each of the candidate partnerships, an external consultant interviewed a representative sample of stakeholders. The need for EU action as well as its added value were covered in those interviews.

The explanatory memorandum and the impact assessment (horizontal part, Section 3) contain a dedicated section on the principle of subsidiarity, as explained in question 2.2 below.

**2.2 Does the explanatory memorandum (and any impact assessment) accompanying the Commission's proposal contain an adequate justification regarding the conformity with the principle of subsidiarity?**

The impact assessment accompanying the proposal features a horizontal part on relevant common elements to all the candidate partnerships, including the conformity of the proposed initiative with the principle of subsidiarity (Section 3). Moreover, the individual assessments of each candidate partnership include additional details on subsidiarity, touching in particular on the specificities of a candidate partnership that could not be adequately reflected in the horizontal part of the impact assessment. This will also be reflected in the explanatory memorandum.

**2.3 Based on the answers to the questions below, can the objectives of the proposed action be achieved sufficiently by the Member States acting alone (necessity for EU action)?**

National action alone cannot achieve the scale, speed and scope of support to R&I needed for the EU to meet its long-term Treaty objectives, to deliver on the EU's strategic policy priorities (including the climate and energy goals set out in the Paris Agreement, and the European Green Deal), and to contribute to tackling global challenges and meeting the

[32] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:12016E/PRO/02&from=EN

| |
|---|
| Sustainable Development Goals (SDGs). |
| (a) Are there significant/appreciable transnational/cross-border aspects to the problems being tackled? Have these been quantified? |
| The thematic areas covered by the candidate partnerships feature a series of challenges in terms of cross-border/transnational aspects, need to pool resources, need for a critical mass to meet intended policy objectives, need to coordinate different types of actors (e.g. academia, industry, national and regional authorities) across different sectors of the economy and society, which cannot be tackled to the same degree by Member States alone. This is particularly true for the research and innovation (R&I) dimension of the proposed initiative: the importance of a multi-centre and interdisciplinary approach, cross-country data collection and research, and the need to develop and share new knowledge in a timely and coordinated manner to avoid duplication of efforts are key to achieve high quality results and impact. The Interim Evaluation of Horizon 2020 and the impact assessment of Horizon Europe provide extensive qualitative and quantitative evidence on the above points. In addition, Sections 1 and 2 of the individual impact assessments on the candidate partnerships include more detail on the necessity to act at EU-level in specific thematic areas. Finally, it is worth noting that not all Member States have the same capacity or R&I intensity to act on these challenges. As the desired policy objectives can be fully achieved only if the intended benefits are widespread across the Member States, this requires action at the EU-level. |
| (b) Would national action or the absence of the EU level action conflict with core objectives of the Treaty[33] or significantly damage the interests of other Member States? |
| As per Article 4(3) TFEU, national action does not conflict with core objectives of the Treaty in the area of R&I. The absence of EU level action in this area would however prevent the achievement of core objectives of the Treaty. Indeed, national action alone cannot achieve the scale, speed and scope of support to R&I needed for the EU to meet its long-term Treaty objectives on e.g. competitiveness, to deliver on the EU's strategic policy priorities, and to contribute to tackling global challenges and meet the Sustainable Development Goals (SDGs). |
| (c) To what extent do Member States have the ability or possibility to enact appropriate measures? |
| As foreseen by Article 4(3) TFEU, this proposal does not hamper Member States' ability to enact appropriate measures in the field of R&I. However, the scale and complexity of the policy objectives pursued by the present initiative cannot be fully addressed by acting at national level alone. |
| (d) How does the problem and its causes (e.g. negative externalities, spill-over effects) |

[33] https://europa.eu/european-union/about-eu/eu-in-brief_en

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| vary across the national, regional and local levels of the EU? |
| As described in the horizontal part of the impact assessment accompanying the present proposal, several problems (e.g. on competitiveness, global challenges, demographic change) and their underlying causes affect the EU as a whole rather than individual Member States. Where important differences between Member States are present, these are described in Sections 1 and 2 of the individual impact assessments. |
| (e) Is the problem widespread across the EU or limited to a few Member States? |
| The problem of coordinating R&I efforts in the thematic areas covered by the candidate partnerships affects all Member States, albeit to different degrees. However, from a general EU perspective, available evidence shows that the EU as a whole needs to step up efforts and investments in thematic areas that are crucial to tackle present and future policy challenges on several fronts, e.g. ageing population, global technological trends, and climate change to name a few. The way these problems affect the EU and its Member States is described in the horizontal part of the impact assessment and in Sections 1 and 2 of the individual impact assessments. |
| (f) Are Member States overstretched in achieving the objectives of the planned measure? |
| As indicated in the horizontal part of the impact assessment and in Sections 1 and 2 of the individual assessments, the sheer scale, speed and scope of the needed support to R&I would overstretch national resources, without guaranteeing the achievement of the intended objectives. Acting at EU-level would achieve greater impact in a more effective and efficient manner. |
| (g) How do the views/preferred courses of action of national, regional and local authorities differ across the EU? |
| No specific differences between the views of national, regional and local authorities emerged from the stakeholder consultation. |
| **2.4 Based on the answer to the questions below, can the objectives of the proposed action be better achieved at Union level by reason of scale or effects of that action (EU added value)?** |
| EU funded R&I activities, including those covered by the present proposal, produce demonstrable benefits compared to the corresponding national and regional initiatives, due to the scale, speed and scope achievable by acting at the EU level. In addition, the proposed initiatives should be seen as complementary and reinforcing national and sub-national initiatives in the same area. |

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| (a) Are there clear benefits from EU level action? |
| Quantitative and qualitative evidence of the benefits of EU level action are available in the interim evaluation of Horizon 2020 and in the impact assessment of Horizon Europe, among others. An analysis of the emerging challenges in each thematic areas, of the EU's competitive positioning, as well as feedback gathered from different types of stakeholders for the present impact assessment indicate that EU level action remains appropriate also for the present proposal. In addition, the benefits of acting at EU-level have been illustrated by the success and the impact achieved by the predecessors to the proposed initiative. |
| (b) Are there economies of scale? Can the objectives be met more efficiently at EU level (larger benefits per unit cost)? Will the functioning of the internal market be improved? |
| EU funded R&I activities, including those covered by the present proposal, produce demonstrable benefits compared to the corresponding national and regional initiatives, due to the scale, speed and scope achievable by acting at the EU level. This is the case both in terms of effectiveness in achieving intended policy objectives, but also in terms of efficiency. Positive impact is also visible in terms of competitiveness: recent data on EU funded R&I activities indicate that EU-funded teams grow 11.8% faster and are around 40% more likely to be granted patents or produce patents applications than non-EU funded teams. Efficiency gains are also visible in terms of dissemination of results to users beyond national borders, including SMEs and citizens. EU funded R&I is more effective in leveraging private investment. Finally, there are clear additionality benefits (i.e. EU R&I funding does not displace or replace national funding), as the EU focuses on projects that are unlikely to be funded at national or regional level. Overall, this is beneficial to the functioning of the internal market in several respects, including human capital reinforcement through mobility and training, the removal of barriers to cross-border activity for economic players including SMEs, easier access to finance and to relevant knowledge and research, and increased competition in the area of R&I. |
| (c) What are the benefits in replacing different national policies and rules with a more homogenous policy approach? |
| A homogeneous policy approach in the various thematic areas covered by the present proposal would reduce fragmentation and increase efficiency and effectiveness in meeting the intended policy objectives. Indeed fragmentation, persisting barriers in the internal market and differences in the resources available to Member States are some of the key problems that stand in the way of fully achieving the intended policy objectives and reaching the required critical mass to obtain tangible results. Specific detail on how these issues differ in each thematic area are illustrated in Sections 1 and 2 of the individual impact assessments, so as to reflect the specificities of each case. |
| (d) Do the benefits of EU-level action outweigh the loss of competence of the Member States and the local and regional authorities (beyond the costs and benefits of acting at |

national, regional and local levels)?

The proposed initiative does not lead to a loss of competence of the Member States. In fact, the proposed initiative should be seen as complementary and reinforcing national and sub-national initiatives in the same area. Previous quantitative and qualitative assessments of Horizon Europe and Horizon 2020 have shown that the proposed EU-level action do not displace national ones and tend to concentrate on initiatives that would not have been funded by the Member States themselves, or would not have reached the same scale and ambition without EU-level intervention, due to their complexity and trans-national nature.

(e) Will there be improved legal clarity for those having to implement the legislation?

Yes. The proposed initiatives will be implemented in line with the Horizon Europe single set of rules for participation; this will ensure increased clarity and legal certainty for end beneficiaries, other stakeholders and programme administrators. It will also reduce the administrative burden for beneficiaries, and for the Commission services. In addition, the accessibility and attractiveness of the broader Horizon Europe programme, in particular for applicants with limited resources, would be sustained.

**3. Proportionality: How the EU should act**

**3.1 Does the explanatory memorandum (and any impact assessment) accompanying the Commission's proposal contain an adequate justification regarding the proportionality of the proposal and a statement allowing appraisal of the compliance of the proposal with the principle of proportionality?**

The principle of proportionality underpins the entire analysis of the candidate partnerships. Specifically, the analysis included in the accompanying impact assessment is structured along the following logic: 1. Justification of the use of a partnership approach in a given area (including considerations on additionality, directionality, link with strategic priorities) instead of other forms of intervention available under Horizon Europe; 2. If the partnership approach is deemed appropriate, proportionality considerations guide the assessment of which type of partnership intervention (collaborative calls, co-programmed, co-funded or institutionalised partnership) is most effective in achieving the objectives. This will also be reflected in the explanatory memorandum.

**3.2 Based on the answers to the questions below and information available from any impact assessment, the explanatory memorandum or other sources, is the proposed action an appropriate way to achieve the intended objectives?**

The proposed initiative only focuses on areas where there is a demonstrable advantage in acting at the EU-level due to the scale, speed and scope of the efforts needed for the EU to meet its long-term Treaty objectives and deliver on its strategic policy priorities and commitments. In addition, the present proposal leaves full freedom to the Member States to

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| pursue their own actions in the policy areas concerned. This will also be reflected in the explanatory memorandum. |
| (a) Is the initiative limited to those aspects that Member States cannot achieve satisfactorily on their own, and where the Union can do better? |
| The proposed initiative only focuses on areas where there is a demonstrable advantage in acting at the EU-level due to the scale, speed and scope of the efforts needed for the EU to meet its long-term Treaty objectives and deliver on its strategic policy priorities and commitments. |
| (b) Is the form of Union action (choice of instrument) justified, as simple as possible, and coherent with the satisfactory achievement of, and ensuring compliance with the objectives pursued (e.g. choice between regulation, (framework) directive, recommendation, or alternative regulatory methods such as co-legislation, etc.)? |
| For each of the candidate partnerships, the analysis carried out in the accompanying impact assessment has explored several options for implementation. A comparative assessment of the merits of each option also included an analysis of the simplicity of the intervention, its proportionality and effectiveness in achieving the intended objectives. This is reflected in the fact that a tailored approach has been suggested for each candidate partnership, ranging from looser forms of cooperation to more institutionalised ones, depending on the intended policy objectives, specific challenges, and desired outcome identified in each case. |
| (c) Does the Union action leave as much scope for national decision as possible while achieving satisfactorily the objectives set? (e.g. is it possible to limit the European action to minimum standards or use a less stringent policy instrument or approach?) |
| The proposed approach leaves full freedom to the Member States to pursue their own actions in the policy areas covered by the present proposal. |
| (d) Does the initiative create financial or administrative cost for the Union, national governments, regional or local authorities, economic operators or citizens? Are these costs commensurate with the objective to be achieved? |
| The proposed initiatives do create financial and administrative costs for the Union, national governments and, depending on the chosen mode of implementation, for regional and local authorities. In addition, economic operators and other stakeholders potentially involved in the candidate partnerships will also incur some costs linked to implementation. The financial cost of the proposed initiative is covered under the Horizon Europe programme. Its exact amount is still subject to political decision. As regards the candidate partnerships and the different modes of implementation (co-programmed, co-funded, institutionalised), the relevant costs and benefits are assessed in the individual impact assessments covering each candidate partnership. The additional administrative costs of implementation via partnerships are |

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| limited, when compared to the administrative costs of implementation through traditional calls. As indicated by comparable experience with previous initiatives and in feedback provided by a variety of stakeholders, these costs are expected to be fully justified by the benefits expected from the proposed initiative. Where available, additional details on costs are provided in Annex 3 of the impact assessment. |
| (e) While respecting the Union law, have special circumstances applying in individual Member States been taken into account? |
| Where relevant, differences between Member States in capacity and stage of advancement of R&I in specific thematic areas have been taken into account in the individual impact assessments. |

# Annex 6 Additional background information

## 1. BACKGROUND INFORMATION FOR ALL INITIATIVES

### 1.1. Selection criteria of European Partnerships

Partnerships based on Article 185 and 187 TFEU *shall be implemented only where other parts of the Horizon Europe programme, including other forms of European Partnerships would not achieve the objectives or would not generate the necessary expected impacts, and if justified by a long-term perspective and high degree of integration.* At the core of this impact assessment is therefore the need to demonstrate that the impacts generated through a Partnership approach go beyond what could be achieved with traditional calls under the Framework Programme – the Baseline Option. Secondly, it needs to assess if using the Institutionalised form of a Partnership is justified for addressing the priority.

The necessity test for a European Partnership (as set out in the Horizon Europe regulation) has two levels:

1. **The justification for implementing a priority with a European Partnership** to address Horizon Europe and EU priorities. This is linked to demonstrating that a European Partnership can produce added value beyond what can be achieved through other Framework Programme modalities, notably traditional calls in the work programmes (Option 0 – Baseline).

2. **The justification for the use of the form of Institutionalised Partnership**: Once it has been demonstrated that a partnerships approach is justified, co-programmed and/or co-funded forms are considered for addressing the priorities as they are administratively lighter, more agile and easier to set-up (Options 1 and/or 2). As Institutionalised Partnerships require setting up a legal framework and the creation of a dedicated implementation structure, they have to justify higher set-up efforts by demonstrating that it will deliver the expected impacts in a more effective and efficient way, and that a long-term perspective and high degree of integration is required (Option 3).

The outcomes of the 'necessity test' is presented together with the preferred option.

*Figure 6 Horizon Europe selection criteria for the European Partnerships*

| Common selection criteria & principles | Specifications |
|---|---|
| **1. More effective** (Union added value) clear impacts for the EU and its citizens | Delivering on global challenges and research and innovation objectives |
| | Securing EU competitiveness |
| | Securing sustainability |
| | Contributing to the strengthening of the European Research and Innovation Area |
| | Where relevant, contributing to international commitments |

| Common selection criteria & principles | Specifications |
|---|---|
| **2. Coherence and synergies** | Within the EU research and innovation landscape |
| | Coordination and complementarity with Union, local, regional, national and, where relevant, international initiatives or other partnerships and missions |
| **3. Transparency and openness** | Identification of priorities and objectives in terms of expected results and impacts |
| | Involvement of partners and stakeholders from across the entire value chain, from different sectors, backgrounds and disciplines, including international ones when relevant and not interfering with European competitiveness |
| | Clear modalities for promoting participation of smes and for disseminating and exploiting results, notably by smes, including through intermediary organisations |
| **4. Additionality and directionality** | Common strategic vision of the purpose of the European Partnership |
| | Approaches to ensure flexibility of implementation and to adjust to changing policy, societal and/or market needs, or scientific advances, to increase policy coherence between regional, national and EU level |
| | Demonstration of expected qualitative and significant quantitative leverage effects, including a method for the measurement of key performance indicators |
| | Exit-strategy and measures for phasing-out from the Programme |
| **5. Long-term commitment** of all the involved parties | A minimum share of public and/or private investments |
| | In the case of institutionalised European Partnerships, established in accordance with article 185 or 187 TFEU, the financial and/or in-kind, contributions from partners other than the Union, will at least be equal to 50% and may reach up to 75% of the aggregated European Partnership budgetary commitments |

## 1.2. Overview of potential functions for a common back office among Joint Undertakings

| Functions | Current situation | Option of joint back-office | Comments |
|---|---|---|---|
| **Organising calls for grant and proposal evaluations** | Each JU organises this independently. | A central organisation of evaluation, logistics, contracting evaluators, managing the data of the evaluation results<br>Central database of potential evaluators with domain expertise in thematic areas of partnerships | The evaluations would still need to be supervised by the Scientific staff of the individual Joint Undertakings (consensus meetings of expert evaluators etc) |
| **Human Resources related matters** | Each JU has own HR policy and resources<br>Quite some resources spent on recruitment in some JUs | More generic resources and expertise for HR matters<br>More consistency in HR | Ensuring consistency with EC HR policies is already in place |

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| | Some HR facilities are procured from external contractors<br>Some JUs have a Service Level Agreement with COM for HR | policy<br>Shared HR investment for specialised expertise (IP and legal) | |
| **Financial management** | Each JU conducts own financial contract management; differences between JUs<br>Each JU is audited separately.<br>Auditing at project level more frequent than in other Horizon 2020 parts and outsourced by JUs thus differences<br>ECA: too many audits on JUs | Financial management by one core team of financial staff<br>Would reduce the number of interfaces for audits and simplifies the auditing of the all JUs<br>Harmonisation of project auditing | Simplifies the harmonisation of financial management across JUs in line with Horizon Europe |
| **Communication (internal and external)** | Each JU has a separate communication strategies, teams and resources | A common back-office can support activities such as event organisation, dissemination of results, setting up website communication<br>Can help create a more visible Partnership brand | A considerable share of communication activity is partnership specific (addressing particular target groups, synthesising project results) however there are generic communication activities that can be shared<br>Needs to avoid duplication of efforts |
| **Data management on calls, project portfolios, information on project results** | Most JUs but not all use e-Corda for project data<br>Overall IT integration of JUs still difficult | Harmonised data management<br>Reduction of IT systems and support that is procured | This will need to happen regardless of the common back office but will likely be more smooth if managed centrally |

## 2. BACKGROUND INFORMATION FOR THIS SPECIFIC INITIATIVE

### 2.1. Bio-economy and the bio-based industry: definitions and background information

The **bioeconomy** is defined as, "all sectors and systems that rely on biological resources (animals, plants, micro-organisms and derived biomass, including organic waste), their functions and principles. It includes and interlinks: land and marine ecosystems and the services they provide; all primary production sectors that use and produce biological resources (agriculture, forestry, fisheries and aquaculture); and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services.. Its sectors and industries[34] have strong innovation potential due to their use of a wide range of sciences, enabling and industrial technologies, along with local and tacit knowledge[35]." While **biotechnology** is at the heart of **bio-based processes**, health biotechnology and biological medicines are not included in the European Union's (EU) bioeconomy definition. According to the Joint Research Centre[36], in 2015 the bioeconomy in the EU-28 generated ~EUR 2.3 trillion of turnover, which was a 5% increase from 2014. Applying the newest methodology, the JRC estimates[37] that in 2015 for the EU-28 the bioeconomy reached €1,460.6 billion value added, which is 11% of the GDP. **Bio-based industries** accounted for over EUR 600 billion of this total. However, it should be noted that in their review of quantitative approaches for measuring the contribution of the bioeconomy to the total economy, authors stress the lack of harmonized approaches for cross-country comparison, with the exception of the European Commission Joint Research Centre (JRC) dashboards for the EU Member States. The quantification reported in these dashboards follows a methodology elaborated by the JRC in collaboration with the nova-Institute. As example of measurements of bioeconomy size, JRC estimates that 20% of the Finnish chemical industry contributed to the bioeconomy in 2015, whereas the bio-based proportion of the same industry was estimated at 36% by the Natural Resources Institute Finland (Luke) for the same year. This implied a variation in the value added of the bio-based chemical industry ranging from €348,000 (JRC) to €734,000 (Luke). Because of methodological heterogeneities, the JRC reports the size of Finland's bioeconomy to be €13 billion, or 7% of the GDP in 2015, based on the value added approach, whereas the official statistics of Luke indicate considerably higher values of €21.3 billion or 12% of the GDP. Such a large difference highlights the need for a more objective, unified approach to quantify the size of the bioeconomy. The JRC estimate that the bioeconomy added EUR 621 billion of value in the EU, representing 4.2% of the EU's Gross Domestic Product (GDP) and provided employment to over 18 million persons in the EU, mainly in agriculture and the manufacture of food and beverages. **Bio-based industries** employ ~4 million people in the EU[38]. In 2015, the highest value-added annual growth occurred in the manufacture of bio-based chemicals (excluding biofuels) (+26%), bio-electricity production (+15%) and rubber and bio-based plastics manufacture (+13%), generating altogether an additional EUR 3.5 billion of value

[34] *Bio-based industries include: forest-based industries, bio-based chemicals and plastics, paper & paper products, biofuels & bioenergy, bio-based textile sector and pharma.*

[35] European Commission. A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment-Updated bioeconomy strategy. European Commission (2018).

[36] European Commission. Brief on jobs and growth of the bioeconomy 2009-2015. European Commission's Knowledge Centre for Bioeconomy, Joint Research Centre.

[37] European Commission. How big is the bioeconomy (2020), Joint Research Centre

[38] Cefic. Landscape of the European Chemical Industry 2018

added compared to 2014[39]. Further, it is estimated that one million new jobs could be created in the bio-based industries by 2030. It is anticipated that the biotechnology sector will play a key role in realising this potential[40].

The **transition to a bio-based economy is powered by several drivers**. These include[41];

• the need to develop an environmentally, economically and socially sustainable global economy • an over-dependency of many countries on fossil fuel imports and therefore their need to diversify energy sources • the anticipation that fossil fuels such as oil, gas and coal will reach peak production soon • tackling climate change by taking measures to reduce GHG emissions • and the need to stimulate regional and rural development.

For instance, by replacing fossil-based products with bio-based products (which tend to have a smaller carbon footprint[42]) the chemical industry can make a critical contribution to the EU's climate goals, whilst simultaneously generating new job opportunities in the regions[43]. There is potential in major industrial sectors such as chemicals and plastics to replace fossil-based carbon with renewable and recycled carbon as raw materials. Sources of renewable and recycled carbon[44] are as follows: • renewable carbon gained from all types of biomass • recycled carbon from recycling of already existing plastics and other organic chemistry products (mechanical and chemical recycling) • recycled carbon from direct CO2 utilisation of fossil point sources (while they still exist) as well as from permanently biogenous point sources and direct air capture.

Globally, governments and private companies are already providing support and investing in the transformation of the chemical industry[45]. Further, most of the large chemical and pharmaceutical producers have sustainability high on their agendas. Many of them are setting targets to improve the sustainability of their products in the mid to long term to 2050[46]. To achieve these targets businesses are improving sustainability in their entire value chains by considering: sustainable feedstock for their products, use of renewable energy in the manufacturing process, and reducing the environmental impact of the product end-of-life and disposal.

In the EU, the European Environmental Agency (EEA) has been advising that bio-based and biodegradable alternatives to fossil equivalents should be used where the risk of dispersion into the ecosystem is high, e.g. lubricants, materials that are subject to wear and tear, and disposable products.

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[39] European Commission. A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment-Updated bioeconomy strategy. European Commission

[40] European Commission. A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment-Updated bioeconomy strategy. European Commission

[41] IEA n. d. Bio-based chemicals – Value-added products from biorefineries (2018)

[42] Note: not all bio-based products have a smaller carbon footprint when compared to their fossil equivalents

[43] Bio-based Industries Consortium. Strategic Innovation & Research Agenda (SIRA) – Bio-based industries for development and growth in Europe (2017).

[44] Carus M, Raschka A. nova-Paper #10: Renewable Carbon is Key to a Sustainable and Future-Oriented Chemical Industry - Bio-based Economy (2019).

[45] LBNet. UK Top Bio-based Chemicals Opportunities (2017)

[46] LBNet. UK Top Bio-based Chemicals Opportunities (2017)

The raw materials used by the chemicals industry are ~50% organic (fossil and bio-based) and ~50% inorganic (minerals, metals)[47]. The chemicals, plastics and pharmaceuticals sectors include several fully bio-based (e.g. natural dyes and pigments, enzymes, fatty acids) and partly bio-based products. Based on Eurostat data, in 2015, out of 534 products in the NACE Division 20 (Manufacture of chemicals and chemical products), 110 products were fully or partly biobased. Around 40% of these 110 products were 100% bio-based (e.g. tanning extracts of vegetable origin, sorbitol, tall oil), 24% of these products had a bio-based share of at least 10% (e.g. ethylene glycol, carboxylic acid, adipic acid) and the remaining 36% of products had lower bio-based shares (e.g. acetic acid, methanol, epoxy resins). Most of the products (424 in total) in the NACE Division 20 are therefore non bio-based[48]. Hence, there is potential to increase the share of bio-based in partly bio-based products, and to research and develop methods for manufacturing bio-based versions of fossil-based products.

***Environmental benefits***

Chemicals or materials produced from biomass can help to reduce CO2 emissions, by replacing fossil-based resources and feedstocks. Any fossil-based ingredient can be replaced by renewable biomass resources or biomass residues. The carbon in fossil resources was captured millions of years ago and is released at the fossil-based products' end of life. This release of carbon dioxide (CO2) contributes to an increase of greenhouse gas concentration in the atmosphere. Greenhouse gases are one of the major drivers of climate change. To stay below the 1.5-2°C target of global warming, 70% of all coal reserves and at least one third of oil and natural gas reserves need to stay in the ground or their CO2 emissions have to be kept from entering the atmosphere. In comparison, CO2 released by renewable resources was recently captured and will be captured again when biomass is regrown to produce new products. This way, the carbon is kept in a shorter cycle (under sustainable cultivation practices). When biomass is used instead of fossil resources, fossil carbon can remain in the ground. This way, renewable biomass resources contribute to limiting climate change and global warming. As bio-based products are produced from plants that have sequestered atmospheric carbon dioxide during their growth, they can help reduce carbon dioxide emissions associated with fossil-based plastic and contribute to climate change mitigation. For example, bio-based polyethylene resin produced by the Brazilian bioplastic company Braskem sequesters 2.15 tonnes of CO2eq. for every tonne of resin produced i.e. it acts as a carbon sink. In comparison, the production of traditional oil-based polyethylene emits 1.83 tonnes of CO2eq [49]. However, it should be noted that most bio-based plastics have the same product characteristics as their traditional oil-based equivalent. For example, biobased PET is identical to fossil-based PET. Simply because a bio-based plastic is made from natural resources doesn't mean it is biodegradable. Bio-based plastics can be just as durable as oil-based plastic. Bio-based plastic with improved barrier properties for gases (e.g. carbon dioxide and oxygen) can lead to a longer shelf-life of packaged products. Synvina's recylable PEF[50] offers a significant advantage to the packaging industry in comparison to alternative

[47] Piotrowski S, Carus M, Carres D. European Bioeconomy in Figures 2008-2015: Update, April 2018

[48] Piotrowski S, Carus M, Carres D. European Bioeconomy in Figures 2008-2015: Update, April 2018

[49] NNFCC, 2018. Market Perspective: Bio-based & Biodegradable Plastic in the UK (2019)

[50] Synvina, n.d. PEF – Game-changing plastic. Available at: https://www.synvina.com/products/pef/ Date last accessed: 29/03/2019. PEF is referred as the next generation polyester with high potential to replace polyethylene terephthalate (PET), a durable fossil-based polymer. PEF offers numerous benefits compared to PET, such as, superior barrier performance as well as mechanical and thermal properties; high glass transition temperature and lower melting point; recyclable and hence reduced carbon footprint. It cost competitive at industrial scale.

bio-based plastics or barrier materials. Moreover, it also offers a higher mechanical strength, thus thinner PEF packaging can be produced and fewer resources are required. PEF is suitable as the main component or as a barrier layer in cups and trays, flexible packaging as well as bottles for carbonated and non-carbonated soft drinks, water, dairy products, still and sports drinks, alcoholic beverages as well as personal and home care products. An important challenge for the growth of bio-based plastics is the communication of sustainability drivers and credentials to raise awareness, social acceptance and uptake of bio-based plastic products. Therefore, the entire value chain must ensure accurate knowledge transfer to the brand-owners to make correct and poignant labelling for the end-consumer to understand any positive environmental impact of their choice to purchase a bio-based plastic product.

**Low toxicity of bio-based products** is an important benefit for both environment and consumer use, e.g. in specific sectors of bio-based industry such as packaging for food contact, or cosmetics. Petro-chemical alternatives never satisfy the natural-based attribute and could potentially be more toxic in comparison. Manufacturers also use popular ingredients from the health and food sectors in cosmetic products. Different biobased materials (strictly from biomass and not inorganic materials) have different functionalities. For example, substances extracted from plants and other types of biomass can be used to increase shelf life and protect against UV degradation. Many natural substances have bioactive effects such as preserving, healing, anti-inflammatory or emollient effects. Lox toxicity is an important environmental benefit of bio-based agrochemicals, which can contribute to biodiversity preservation, especially if combined with sustainable management of biomass cultivation (e.g. mixed rotation systems, agro-forestry, use of perennial crops, use of certification schemes etc). Bio-based crop protection products start degrading soon after application resulting in little or no toxic residue[51][52]. However, the drawback is that they need to be applied more frequently in order to be effective. Examples of crop protection products include vegetable or fish oils as well as plant essential oils.

As a result of the potential toxicity, often even at very low levels, the application of crop protection products is strictly regulated in Europe[53]. Policy control measures in the EU are driven by the objectives of protecting human health and the environment (consumers, operator safety, protection of water quality and biodiversity).

***European resource independence***

A strong European bioeconomy would replace fossil-based products with renewable alternatives, and reduce the EU's dependency on fossil resources like oil, coal and natural gas. Biomass resources can be grown locally in the EU, in contrast to fossil resources, of which the majority is imported. In the long run, the organic chemistry will strive to become circular and apply reusable raw materials to become largely independent from limited fossil resources.

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[51] Saxena, H., O., Tripathi, Y., C., Kakkar, A., Mohammad, N., 2014. Botanicals as biopesticides: Active chemical constituents and biocidal action. DOI: 10.13140/2.1.2182.4802. Available at: https://www.researchgate.net/profile/YOGESH_TRIPATHI/publication/271073676_Botanicals_as_biopesticides_ Active_chemical_constituents_and_biocidal_action/links/54f142690cf2f9e34efdc2f6/Botanicals-as-biopesticides-Active-chemical-constituents-and- biocidal-action.pdf Date last accessed: 29/03/2019 [11] Warwick Crop Centre, 2018. What are biopesticides? The AMBER project

[52] Warwick Crop Centre, 2017. Biopesticides - pros and cons. The AMBER project. Available at: https://warwick.ac.uk/fac/sci/lifesci/wcc/research/biopesticides/amberproject/biopesticide_uses/ Date last accessed: 29/03/2019

[53] Eurostat, 2018. Agri-environmental indicator - consumption of pesticides

This could in the future also be achieved with recycling and CO2 utilisation, but currently biomass is the most readily available option.

***The sustainability challenge***

Studies have shown considerable potential for the cultivation of biomass for energy and material use on a global level, even under consideration of sustainability criteria such as biodiversity preservation, climate protection or food security. In a sustainable bioeconomy, cultivation and processing of biomass has to be based on sustainable agriculture and forestry, where environmental aspects as well as social and labour standards are given serious consideration. Besides agriculture and forestry, residual biomass can be an important resource for a sustainable bioeconomy. Strong instruments to support the development of a sustainable bioeconomy are certification schemes and labels for renewable raw materials and bio-based products.

The European chemical industry needs to step up the efforts on the path to actively increase its sustainability. One of the goals is to make products that are less harmful to the environment and less toxic to the consumers, and environment, but perform just as well as conventional products or even better. Sourcing an increasing part of its feedstock from biomass is an important way for the chemical industry to become more sustainable. Substituting fossil resources with biomass generally leads to reduced GHG emissions and is an important tool to reach our climate targets. The current share of renewable raw material use in the EU organic chemical industry was estimated by Cefic at around 10% in 2015, but the Bio-based Industries Consortium (BBI JU SIRA2017) set the ambition to reach a bio-based feedstock share of 25% by the year 2030. Many technical solutions to replace fossil resources by biomass have already been developed and currently efforts are undertaken to scale up the production of new, more sustainable products made from biomass.

***The contribution to UN Sustainable Development Goals***

The bioeconomy is at the centre of sustainable development and products made from renewable biomass resources can contribute to achieving the UN Sustainable Development Goals. The production of bio-based chemical products supports in particular the achievement of the following SDGs: SDG 8 - Decent work and economic growth: The bio-based chemical industry can provide new jobs and additional income, in particular in rural communities, and create opportunities to export value-added bio-based products. SDG 9 - Industry, innovation and infrastructure: The bio-based chemical industry is evolving quickly. Many bio-based technologies are entirely new ideas, which require and support innovation and infrastructure development. SDG 11 - Sustainable cities and communities: Bio-based chemistry links surrounding rural areas to urban centres, e.g. by setting up innovative processing plants (“biorefineries”) that transform agricultural residues and parts of municipal solid waste into chemical building blocks. SDG 12 - Responsible consumption and production: The bio-based chemical industry contributes to optimised use of biomass and wastes, decouples production and consumption from fossil energy sources and raises consumer awareness. SDG 13 - Climate action: The use of renewable biomass resources in the chemical industry reduces the use of fossil-based resources and their related greenhouse gas emissions. SDG 15 - Life on land: Through promoting sustainable management of forests and natural resources, bio-based chemistry can support the combat against desertifi

***Circularity issues***

The bioeconomy can contribute to a circular economy, which helps us to move away from a linear economy of "take, make and dispose". The bioeconomy and circular economy go hand in hand. Reducing waste and making optimal use of natural resources are important goals of both the circular economy and the bioeconomy. The circular economy strives to reduce resource consumption. Roughly 90% of the raw materials used in manufacturing become waste before the product leaves the factory. And most products get thrown away within the first six months of their life. But even in a fully circular economy, some input of new raw materials remains necessary. Biomass can provide a sustainable input, because it is renewable and regrows naturally. Chemicals and materials from biomass are part of the natural cycle. They can provide a sustainable input of new materials for a circular economy. The bioeconomy can furthermore make use of many (organic) waste streams and hereby support the circular economy.

Within agriculture, more than half the globally harvested dry mass consists of agricultural residues and inedible biomass, such as cereal and legume straw; shoots of tuber, oil and sugar; vegetable crop stalks, leaves and shoots; and fruit and nut tree prunings. A major barrier to increasing the use of agricultural and forestry residues are the costs associated with adapting harvest logistics, which are often higher than costs of primary fossil materials. Also, residues are an important factor for soil quality and need to remain on the field to a certain extent in order to avoid the depletion of nutrients. Local biorefining systems that smartly match residue supply and material demand need to be developed, as the wide dispersal of residues does not fit the economies of scale of the existing industrial oilbased production system.

– Municipal solid waste contains food waste, which is a potential feedstock for the bio-based chemistry – signifying a high amount of fermentable materials which are mixed up with non-fermentable materials, which are thus difficult to access.

According to recent insights from the S2Biome project, the amount of available lignocellulosic biomass in the EU by 2030 is estimated to be at least around one billion tonnes. However, the biomass types that are currently used by the chemical industry are mainly sugar (from sugar beets and starchcrops) and vegetable oils such as rapeseed, soya and palm oil. Switching to other types of feedstock proves difficult both from a technical and an economic perspective.

– Marine streams: The oceans offer large opportunities for the cascading use in the bioeconomy. These include for example the use of fisheries discards (~40% of caught fish), algal biorefineries, seaweed farming, multi-use of marine space in off-shore platforms, zero-waste and circular aquaculture, new products from jellyfish, new pharmaceuticals from marine ecosystems. Stakeholders mentioned algae in particular as a promising feedstock choice for the future. The BBI-JU also supports a number of algae-based projects for the bioeconomy, e.g. the ABACUS project, the VALUEMAG project or the MAGNIFICENT project. The results of several previous projects, however, also give reason for some caution of expectations. The utilisation of algae is not easy and so far quite costly.

Focused research and development could be directed towards cascading use and utilizing of currently unused waste streams. There are several EU projects ongoing that focus on the

utilization of such waste streams: Some examples are the Lifecab project[54], the Embraced project[55] and the Agrimax project[56]

**Empowering primary producers and global best practice**

– Enable producers to make informed decisions on the use of their residues

– Ensure that producers are receiving a fair price for collecting waste that can be used as a 3rd generation feedstock.

– Actively involve producers as stakeholders

– Relevant international example: US Biomass Crop Assistance Program, which provides funds to farmers and forester landowners that grow and harvest "non-conventional" biomass. Examples are perennial crops or agricultural and forestry residues, which are intended to be used for energy and bio-based products in biomass conversion facilities. A similar system could be established in the EU, e.g. via the Common Agricultural Policy.

***Bringing solutions to the market***

Many products on the market are already made from chemicals or materials based on renewable biomass resources, beyond traditional bio-based resources, such as wood or paper. The chemical industry already offers a broad variety of products made from renewable resources. Some examples include: compostable plastic bags, personal care products, natural detergents, plant-based drinking bottles, planting pots for garden use or automotive parts, e.g. insulation materials, or composites with natural fibres used in dashboards. Even though these products are made from biomass, they can look, feel and perform as conventional, fossil-based products or even better. For example, in the building sector, an increasing number of architects and construction companies return to applying construction materials produced from renewable resources, and it is more than just wood for the walls. Insulation, flooring and paints can be made from bio-based materials as well, where they provide a healthier and more comfortable indoor climate. Renewable raw materials are also widely used in cleaning products or packaging sectors. Biotechnology provides bio-based ingredients such as enzymes for detergents. Enzymes can help in reducing the environmental impact of washing and cleaning products by using less energy and water, while providing the same or better cleaning results under milder conditions.

***Competitiveness of the EU bio-based industry***

In 2015, 10% of the total volume of organic chemicals raw materials/feedstock used for EU chemicals production was bio-based. 2030 aspirational target is to increase bio-based

[54] LIFECAB Project [Internet]. [cited 2019 Jan 7]. Available from:http://ec.europa.eu/environment/life/project/Projects/index.cfm?fuseaction=search.dspPage&n_proj_id=6190

[55] Embraced - Project - Establishing a multi-purpose biorefinery for the recycling of the organic content of Absorbent Hygiene Products Waste in circular economy. [Internet]. [cited 2019 Jan 21]. Available from: https://www.embraced.eu/project

[56] AGRIMAX – Agri and food waste valorisation co-ops based on flexible multi-feedstocks biorefinery processing technologies for new high added value applications [Internet]. [cited 2019 Jan 7]. Available from: http://agrimax-project.eu/

feedstock use to 25%. Besides the product group specific analysis of barriers (see market segment analysis below), some wider issues exist that concern the chemical industry in the bioeconomy. These are referred to as general barriers, and can be classified according to increasing the bio-based share in the chemical industry into six main categories. For each of these categories, several actions can be attributed.

**Barriers 1, 4, 5 and 6 are in direct scope of the present Impact Assessment**. The barriers 2 and 3 remain of importance, however can be considered beyond the scope.

Barrier 1. Access to feedstock (including low availability of sustainable biomass, and non-level playing field with competing uses of biomass such as for bioenergy). Actions attributed: Increasing yields of production of biomass, establishing and identifying new sources of feedstock, increasing efficiency of biomass supply chains, developing sustainable biorefineries, and establishing a balance between various types of uses of sustainable biomass.

Barrier 2. Competition with established fossil industry (including bio-based alternatives not cost-competitive, and lower performance of bio-based alternatives). Actions attributed: Implementing market pull instruments (e.g. labelling, procurement, certification), reducing fossil feedstock support, increasing performance characteristics of bio-based products by R&D investments, promoting industry- or voluntary incentives.

Barrier 3. Regulatory barriers (including lack of policy harmonization, limited long-term reliability). Actions attributed: Harmonisation of standards, policies and regulations, providing stability and reducing risk by long-term regulatory policy, guidance, support and clarification for policy for bio-based products.

Barrier 4. Societal barriers (including lack of information, awareness and expertise, or unrealistically high expectations). Actions attributed: promoting labels, standards, improving education and training, design and implement visible, inclusive, transparent and coherent communication effort for the bioeconomy and bio-based sectors, improve participatory approaches and network building, improve social acceptance and promote trust to manage unrealistically high expectations.

Barrier 5. Markets, Finance & Investment (including low availability of funding for early stage and scale-up, low funding for start-ups and SMEs). Actions attributed: developing green investment funding schemes and programmes, reuce high transaction costs for start-ups and scale-up operations, support easier market entry of SMEs e.g. via innovative tax schemes and support measures, strengthen communication channels for financing opportunities.

Barrier 6. Research & Development (including ongoing need for funding, limited guidance and direction of R&D, and limited understand of ecological boundaries and innovation adoption and diffusion). Actions attributed: deploying additional, targeted financial instruments, improving access to finance for R&D opportunities, maximising impact of EU R&D programmes, enhancing knowledge on biodiversity, ecostystems and bioeconomy.

*Key market segment study analysis (plastics/polymers, agrochemicals, surfactants, bio-based fibres, solvents, adhesives, cosmetics)*

**Plastics/polymers**

The trend towards bio-based plastics is driven by changing consumer demands with increased awareness of environmental impacts of the plastics industry.

• To make plastic products more resource efficient and to reduce GHG emissions, the emphasis is on increasing the use of renewable feedstock using lower energy processing, while reducing the dependency on fossil resources.

• Several innovative small and large companies are responding to consumer demands towards a more sustainable plastics economy. These companies have made substantial investments in R&D for bio-based plastics designed with the circular economy in mind, e.g. PLA, PEF and bio-PTT.

• Bio-based production of plastics/polymers in Europe is >1,200 kt/yr, while fossil-based production is ~70,000 kt/yr.

• Therefore, out of the analysed product groups, the addressable market of fossil-based plastics/polymers production in Europe is the largest (large addressable market is considered as >10,000 kt).

• Diverse bioplastics are being developed that can be drop-ins, compostable and non-biodegradable, but few are truly biodegradable.

• Some bio-based plastics listed meet the desired sustainability characteristic for low GHG emissions, which is a key driver for thermoplastics. Low human toxicity is an important driver for some thermoplastics used in healthcare and food packaging, e.g. bio-PVC.

• Recyclability is the sustainability characteristic that most conventional plastics and their bio-based alternative plastics already possess. However, some bio-based plastics, such as PLA and PHAs cannot be recycled with current well-established recycling infrastructure and there is evidence that recyclability is a desired sustainability characteristic of these bio-based plastics. Therefore, further R&D in product development and recycling techniques is required to ensure that recyclability does not compromise performance.

• Bio-based drop-ins may not be compostable/biodegradable but would be recyclable – otherwise, biopolymers might conflict with recycling goals. Non-biodegradable biopolymers could also contribute to carbon sequestration.

• Biodegradability is considered an important end-of-life pathway, especially when recycling is no longer technically possible. Additives are available that could increase the rate of biodegradation in treated plastic products, though claims need to be appropriately verified.

• Producers of bio-based plastic should provide adequate labelling to inform customers of types of biobased plastics to raise awareness about bio-based plastic alternatives and end-of-life processing.

• Although TRLs for some the bio-based plastics listed are already at 9, there are some that require further R&D (including investment) and industrial trials to improve technical properties and reduce production costs to successfully grow at commercial scale.

• Some of the leading manufacturers are Genomatica, Versalis, Cargill, Synbra Technology, Novamont, BASF SE, Natureworks, Corbion, Braskem, Secos Group, Biome Technolgies, FKuR Kunststoff, Innovia Films, and Toray Industries.

***Agrochemicals***

There is a growing market for fertiliser coatings that are bio-based and biodegradable, as well as for biostimulants (including chitosan, seaweed extracts) and biological seed treatment (including botanicals).

• Biodegradability, low human toxicity and low ecotoxicity are the desired sustainability characteristics in agrochemicals. However, the bio-based chemical has to at least have the same level of performance as the fossil-based agrochemical.

• Bio-based chemical building blocks such as bio-based lactic acid, methanol and fatty alcohols present an opportunity for converting conventional fossil-based agrochemicals into partly bio-based equivalents. The performance of the latter should be, at least, at par with the fossil-based agrochemicals.

• Bio-based crop protection products start degrading soon after application resulting in little or no toxic residue. However, the drawback is that they need to be applied more frequently in order to be effective. Formulation of bio-based crop protection products can be improved to address this issue.

• New bio-based crop protection products can help address the issue of pesticide resistance in pest populations.

• European agrochemical industry is strictly regulated. Use of new ingredients in products is subject to long and often expensive approval procedures. There is a low risk category within the legislation 1107/2009 that places plant protection products on the market. This could be readily adapted for speedier approval of biobased pesticides and is already ratified by the European Parliament. However, it is yet to be actioned by the European Commission.

• Key actors of European agrochemical industry include: Syngenta, Bayer Crop Science, Corteva (Dow Agrosciences, DuPont and Pioneer merger), BASF, Sipcam- Oxon

***Surfactants***

Bio-based surfactants are produced as high value products, typically for high-end customer products, such as personal care and home care products.

• Methyl ester sulfonate (MES) offers the biggest opportunity to shift from fossil to bio-based surfactants. It could be a bio-based alternative for linear alkyl benzene sulfonate (LAS) and has high potential to be used in cosmetic products.

• The demand for bio-based surfactants strongly depends on household spending.

• There is drive/requirement for clear labelling, so consumers can increasingly opt to buy product using biobased alternatives.

• The key drivers for bio-based surfactants are their biodegradability, lower human toxicity and lower ecotoxicity, especially in environments where these sustainability characteristics are required.

• Production of bio-based surfactants in Europe is

~1,100 kt/yr, while fossil-based production is ~2,400 kt/yr.

• The addressable market of fossil-based surfactants production in Europe is medium-sized (1,000-10,000 kt/yr) in comparison to the other eight product groups.

• Besides being made from renewable feedstock, the main advantages of bio-based surfactant are possible antimicrobial properties; better performance compared

to fossil equivalents which allows to use smaller quantities of surfactants; better foaming properties; higher selectivity for application at lower temperatures, higher pH and salinity; ability to achieve regulatory compliances with regard to (environmental) safety and use of lowcost feedstocks (i.e. fats and oils, sugars).

• Due to the advanced product properties the use of biobased surfactants is possible in a wide range of product applications (cleaning, personal care, food processing, agrochemicals and textiles). However, these products remain niche due to their limited cost competitiveness compared to conventional products.

• Bio-based surfactants are usually used in end product formulations where the modification of one component has an impact on the overall composition and performance, which causes additional development costs. This cost barrier could be overcome by targeted support and funded research towards new product formulations. The clear advantage for companies is flexibility in composition, as long as a certain performance can be ensured.

• Due to the limited number of large-scale producers a secured steady supply of bio-based surfactants is uncertain which creates risk for suppliers like personal and home care producers.

• Key companies producing bio-based surfactants include Evonik, Ecover, Henkel, Saraya, Soliance, Wheatoleo and Nouryon.

***Bio-based fibres***

Bio-based man-made fibres production in Europe is >600 kt/yr, while fossil-based production is ~4,800 kt/yr.

• The addressable market of fossil-based man-made fibre production in Europe is medium-sized (1,000-10,000kt) in comparison to the other analysed product groups.

• Consumer demand and initiatives by producers have driven the increase in the use of bio-based and recycled feedstock, as well as sustainability across the man-made fibres supply chain.

• Recyclability is the sustainability characteristic that all conventional and several bio-based alternatives have. However, recycling is not easy in case of blends such as fabric made of polyester and cotton with a small percentage of elastane. Another example is PLA which

cannot be recycled with PET in established recycling infrastructure. Therefore, there is scope for further R&D in recycling techniques for different fibres.

• There is a drive to make conventional plastics such as PET and nylon biodegradable by adding 'additives'. While these additives are available on the market, the claims of biodegradation rarely pass rigorous testing and review. However, it does show that biodegradability is considered important for synthetic polymers when they approach end-of-life and cannot be recycled anymore.

• The production of some biosynthetic fibres could potentially result in low GHG emissions and some have low toxicity effect.

• Some bio-based fibres, such as bio-PTT, can be produced at lower cost compared to their fossil-based equivalents, and have properties that surpass fossil-based equivalents in fibre applications.

• There are several bio-based man-made fibres that are still at research and demonstration scale. Further R&D and industrial trials are needed to bring these fibres to commercial scale. Example of an ongoing projects in Europe is FIBFAB (H2020 project) on PLA fibre.

• Some of the companies that are actively involved in

bio-based man-made fibres market include: DuPont (Sorona®), Sofila (use Arkema's Rilsan®), Aquafil, RadiciGroup (Radilon® DT 40EP25W), BASF, Solvay, Distrupol, Sateri (viscose), Lenzing (TENCELTM), AlgiKnit.

***Solvents***

Bio-based solvents production in Europe is <0.5 kt/yr, while fossil-based production is ~5,000 kt/yr. The addressable market of fossil-based solvents production in Europe is medium-sized (1,000-10,000kt) in comparison to the other eight product groups.

• The uptake of bio-based solvents is driven by the EU policy on VOC emissions and by REACH. Those biobased alternatives which meet the criteria of low toxicity and low VOC, compared to the fossil-based counterpart, are likely to be considered as valid alternative provided that they meet the functionally requirements of the solvent in specific applications.

• Conventional and bio-based solvents identified are biodegradable (some more than others), and there is concerted effort from the industry to recover and recycle solvents where possible. This is driven by legislation that aims to reduce the adverse impact of solvents (VOCs) on human beings and the environment. It should be noted that solvents can be recovered and recycled in some sectors and applications but not in others.

• Industries are taking as many steps as possible to remain competitive, by reducing waste and recycling spent solvents. It is very important for producers, especially the ones who are using solvents for extraction, to be able to recycle and reuse the solvent. Extraction is a common processing step in chemical, food, pharmaceutical and mining industry.

• For products that are likely to end up in the environment, complete biodegradability is a relevant sustainability driver. This is the case of solvents that are typically used in formulation of cleaning products (household cleaners, personal care) or agrochemicals. However, the

biggest industrial end-group in which solvents are used are paints and coatings, in which solvents evaporate after the paint has been applied, thus dissipating into the air. In such cases, biodegradability is not a relevant sustainability driver.

• Many 'dedicated' bio-based solvents included in this analysis claim to have low toxicity effects compared to fossil equivalents.

• The production of some identified bio-based solvents has been reported to release less GHG emissions compared to fossil equivalents.

• Bio-based solvents need to meet the functional requirement of the fossil equivalents that they intend to replace in different applications. There is significant scope for R&D and demonstration scale projects to develop a wide range of bio-based solvents and formulations that can be used in different applications.

• Some of the companies actively involved in the biobased solvents market include: Cellulac, BioAmber, Green Biologics, DuPont-Tate & Lyle, Pennakem Europa SAS, Circa, Roquette, Cargill, Solvay-Rhodia

***Adhesives***

Production cost is an important driver in the adhesives segment.

• The key sustainability driver is to reduce human toxicity by lowering Volatile Organic Compounds (especially for the wood building industry which is one of the most significant markets for adhesives).

• Environmental and health concerns related to formaldehyde create a major opportunity for the development and growth of bio-based chemicals which could replace formaldehyde. Bio-based 5-HMF and lignin derivatives are among the most promising candidates.

• A range of bio-based raw materials such as diacids, diols and natural polyols building blocks are available as a drop-in or dedicated replacement of fossil-based building blocks for adhesives and sealants.

• Keeping suitable mechanical properties while reducing the emission of VOCs is the key development and innovation trend in the adhesives segment.

• Bio-based alternatives must deliver the desired mechanical performance characteristics and water resistance requirements in adhesives. Meeting these requirements may initially rely on the development of mixed bio and fossil-based adhesives.

• Legislation may lead to accelerating the transition from synthetic adhesive to bio-based adhesives by regulating the presence of VOCs and the presence of recyclable materials, especially in the building industries.

• Some companies active in the development of new biobased adhesives are: VTT (Finalnd), Arkema (France), Weiss Chemie + Technik (Germany) and Covestro (Germany)

***Cosmetics***

The share of bio-based chemicals in cosmetics produced in the EU is about 40%, which is the highest among all product groups that are considered in RoadToBio.

• European consumers' emerging environmental awareness and a growing trend for natural products is driving the uptake of bio-based chemicals in cosmetics. Costs are less important constraints in the cosmetics segment.

• Biodegradability and low human toxicity are the main desired sustainability characteristics in the cosmetics product group. Bio-based products such as botanical extracts and vegetable oils have these key characteristics. However, bio-based solvents such as acetone are toxic and non-biodegradable, thereby presenting an opportunity for development and commercialisation of novel bio-based solvents that are safe to use and dispose.

• Functional ingredients and chemical building blocks used in cosmetics such as preservatives, solvents and surfactants are still mainly derived from fossil feedstock and therefore not sustainable. • Low GHG emissions is a desired sustainability characteristic for building blocks such as solvents and surfactants that are used in cosmetics. The bio-based chemicals identified in the sample could lead to low GHG emissions compared to the fossil equivalents.

• By volume of use, botanical extracts and vegetable oils outweigh building blocks like lactic acid and succinic acid. In order to attain higher bio-based share in the cosmetics product group, these two subgroups will play a vital role and therefore should be the subject of further research and product development.

• Bio-based preservatives underperform in comparison to the fossil derived ones. This area of cosmetics presents an opportunity for the development and further growth of bio-based chemicals. • European cosmetics industry is strictly regulated. Ingredients such as preservatives, UV-filters, nanomaterials or colorants are subject to long and often expensive approval procedures. Other ingredients must be safe for cosmetic use by meeting the requirements of EU legislations (cf. REACH and Cosmetic Regulation)

• Opportunities also exist in using alternate feedstocks like algae, and technology for the extraction and preservation of bioactive ingredients.

### 2.2. Glossary

***1G feedstock First generation feedstock***: the source of carbon is sugar, lipid or starch directly extracted from a plant. The crop is actually or potentially considered to be in competition with food.

***2G feedstock Second generation feedstock***: the carbon is derived from cellulose, hemicellulose, lignin or pectin. For example this may include agricultural, foresty wastes or residues, or purpose-grown non-food feedstocks (e.g. Short Rotation Coppice, Energy Grasses).

***3G feedstock Third generation feedstock***: the carbon is derived from aquatic autotrophic organism (e.g. algae). Light, carbon dioxide and nutrients are used to produce the feedstock "extending" the carbon resouce available for biochemicals production. This means, however, that a heterotrophic organism (using sugar or cellulose to produce biochemicals) would not be considered as 3G.

***Bio-based drop-in chemicals:*** bio-based versions of existing petrochemicals which have established markets. They are chemically identical to existing fossil-based chemicals.

***Bio-based smart drop-in chemicals:*** a special sub-group of drop-in chemicals. They are also chemically identical to existing chemicals based on fossil hydrocarbons, but their bio-based pathways provide advantages compared to the conventional pathways.

Drop-in chemicals are considered to be 'smart drop-ins' if at least two of the following criteria apply:

• The Biomass Utilization Efficiency from feedstock to product is significantly higher compared to other drop-ins.

• Their production requires significantly less energy compared to other production alternatives.

• Time-to-product is shorter due to shorter and less complex production pathways compared to the fossil-based counterpart or other drop-ins.

• Less toxic or harsh chemicals are used or occur as by-products during their production process compared to the fossil-based counterpart or other drop-ins.

***Dedicated bio-based chemicals:*** chemicals which are produced via a dedicated pathway and do not have an identical fossil-based counterpart. As such, they can be used to produce products that cannot be obtained through traditional chemical reactions and products that may offer unique and superior properties that are unattainable with fossil-based.